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At the Party's Call--On to New Great Deeds!

The June Plenum of the Central Committee of the Communist Party of the Soviet Union, devoted to the problem of the work of party and Soviet organizations and of the National Economic Councils for carrying out the resolutions of the Twenty-First Congress of the Communist Party of the Soviet Union concerning the acceleration of technical progress in industry and construction, was a historic event in the life of the Soviet government.

The Plenum heard and discussed the reports of the Moscow City, Leningrad, Stalino, Sverdlovsk and Dnepropetrovsk National Economic Councils; the report of the State Committee of the Chemistry Council of Ministers USSR concerning the fulfillment of the decree of the Plenum of the Central Committee of the Communist Party of the Soviet Union dated 7 May 1958 with reference to acceleration in the development of the chemical industry and particularly of the production of synthetic material and articles made of them for the purpose of satisfying the needs of the population and the needs of the national economy; a report on measures for the further increase in production of the textile industry. The Plenum adopted an Appeal to the Soviet People, calling on it for heroic work in the building of communism.

The Plenum, in the work of which scientists, leading constructors, production leaders, inventors and efficiency experts participated along with leading party, Soviet, economic trade-union and Komsomol workers, presented a developed program for technical progress in the national economy of the Soviet Union. In its Appeal, permeated with Leninist passion, Bolshevist conviction and strength, the Plenum called on men and women workers, men and women kolkhoz workers, Soviet intelligentsia, and all the workers of the Soviet Union for new glorious feats of labor.

The material of the Plenum and the resolutions adopted by it were given unanimous approval and enthusiastic support by all the peoples of the Soviet Union. Everywhere, at meetings and gatherings in factories, buildings, in kolkhozes and sovkhozes, in scientific institutions, in small and large units of the Armed Forces the Soviet people declared that the resolutions of the Plenum were in full accord with the vital interests of all the peoples of the Soviet multinational socialistic Fatherland, and are of tremendous importance for the great work of building a communistic society. Numerous reports from the Chinese People's Republic, Czechoslovakia, the German Democratic Republic, Poland, Bulgaria, Hungary and other socialist countries have shown convincingly that the resolutions of the June

Plenum of the Central Committee of the Communist Party of the Soviet Union, directed at fulfillment of the Seven-Year Plan, have been given the unanimous approval of the entire mighty socialist camp, that the accomplishment of these resolutions is a great triumph of the overwhelming teaching of Marxism-Leninism.

In the Soviet Union a new great step has been made in the development and technical perfection of all branches of the national economy. Progress in the work of industry, transportation, agriculture and construction for the first half-year of 1959 shows that workers, kolkhozniks, Soviet intelligentsia--all of the hard-working persons of the Soviet Union--have taken the Seven-Year Plan as their very own vital concern and are struggling persistently for its fulfillment. After the Twentieth Congress of the Party, more than five thousand new machines, mechanisms, apparatuses and devices have been created and put into mass production, progressive technological processes have been developed and adopted on a broad scale, and the level of mechanization, particularly of heavy and laborious processes, has been raised considerably. The entire world knows of the eminent achievements of the USSR in the peaceful use of atomic energy, in jet aircraft, and in the firing of the first artificial earth satellites and the first cosmic rocket in the history of mankind.

A truly revolutionary measure has been the reorganization of the control of industry and construction, which has made it possible to assure a notable increase in production and to solve a number of important technical problems. In his speech to the Plenum of the Central Committee of the Communist Party of the Soviet Union, Nikita Sergeyevich Khrushchev siad: "All the branches of the national economy of our country are in full swing. Many groups of enterprises in Moscow, Leningrad, Sverdlovsk, Vladimir, the Ukraine, Belorussia and other industrial centers, oblasts and republics have assumed the duty of fulfilling the requirements of the Seven-Year Plan before time through the better utilization of internal reserves. The duties of these economic regions in fulfilling the requirements of the Plan before time is an index of our growing strength and tremendous possibilities. This, at the same time, shows that as a result of the reorganization of the control of industry and construction production in the Soviet Union has begun to develop even more quickly".

The Communist Party is calling for the mobilization of the will, energy and all the personnel of the party, Komsomol and trade-union organizations and of the whole working class to accelerate the tempos of technical progress and

assure the accomplishment of the great tasks of the Seven-Year Plan before time.

Realizing the resolutions of the Twenty-First Congress of the Party means gaining the important thing in our peaceful economic competition with capitalsim--time. Gaining time in the competition with the United States means providing our generation with the highest standard of living, which cannot be achieved even by the richest capitalistic country. Gaining time means guaranteeing the Soviet people and the peoples of the entire socialist camp a peaceful life, assuring the safety of all mankind. It is specifically for this reason that the party is directing the efforts of the working class with such persistence toward all-possible economy in time in construction, showing that the Soviet Union has every opportunity of further accelerating its progress.

The Plenum of the Central Committee emphasized in its decree that all the necessary conditions are present in the Soviet Union for successfully accomplishing the outlined program of further increase in the technical production level.

The main thing at the present time is the level of the organizational work, party and economic leadership in the matter of adopting progressive technique to the level of the new tasks, concentrating the attention of Party, Soviet, administrative trade-union and Komsomol organizations on the elimination of serious defects which exist in the work on the technical perfection of all branches of the national economy and which are holding down the tempo of technical progress. In connection with this, the Plenum has directed the serious attention of the entire Soviet community to the solution of urgent problems in the further development of the national economy, the development and incorporation of new technical equipment, comprehensive mechanization and automation of industrial processes, and the development of the chemical industry.

The incorporation of the new technical equipment should lead not only to an increase in output but also, of necessity, to an increase in productivity and a facilitation of labor of the workers, an improvement in the quality and decrease in the cost of production. The Plenum of the Central Committee of the Communist Party of the Soviet Union has noted that the defects still existing in the matter of incorporating new technical equipment are engendered to a considerable degree by conservatism of part of the industrial administrators and engineering-technical workers, by force of habit of working according to the old method, by a lack of desire to surmount the difficulties associated with incorporating new technical equipment, by the lack of the

governmental approach to problems of technical perfection of industry.

Being guided by the great and responsible tasks posed to all of Soviet science by the party, military medical workers, regardless of the area in which they are working, should direct their entire attention and efforts to the maximum utilization of the new theoretical research, conclusions, recommendations, discoveries and latest scientific and technical achievements developed by scientists in collaboration with industrial workers, for the further improvement in the technical equipment of the military medical service.

The attention of military medical workers should be concentrated on the development and incorporation into practice of new instruments and apparatuses for suturing blood vessels, nerves, for operations on the internal organs, making it possible to shorten the duration of the operations and to decrease the trauma produced. Radioelectronic apparatus and devices for rapid diagnosis and treatment as well as for rush methods of laboratory analysis should be incorporated into medical practice in all possible ways. Instead of the existing disinfection methods, which are not very productive, new, more effective methods should be applied such as ultrasound and high frequency currents for the disinfection of uniforms and the sterilization of surgical instruments and dressing material. It is necessary to proceed from words to deeds in the matter of creating highly effective and rapid-acting devices for comprehensive medical reconnaissance, new mechanized facilities for gathering up and transporting the wounded from the battlefield.

For the purpose of building a communistic society technical progress in the national economy is of the greatest importance. In the decree of the Plenum of the TsK KPSS /Central Committee of the Communist Party of the Soviet Union/ means are indicated for a new expansion of all branches of the national economy. The principal means of technical progress is comprehensive mechanization and automation of the industrial processes.

Automation is not only a technical but also an important social problem. The incorporation of automation radically alters the nature of work by markedly increasing its productivity, facilitates and improves the working conditions, contributes to an improvement in the cultural-technical level of the workers. In industry, agriculture and transportation--everywhere conditions are created for the elimination of the existing difference between mental and physical work with the incorporation of automation. With the development of automation the role of man is reduced to

accomplishing only the most complex control functions. Man will devote himself to the perfection of production, to the smooth operation of automatic machines and the observation of them.

The appeal by the TsK of the party for the development of the initiative of laborers, engineering-technical workers and scientists as a whole also applies to all the military medical workers of the Soviet Army and Navy.

The organizational level and content of the work in the development of the chemical industry does not as yet satisfy the problems posed, as has been recognized by the Plenum of the TsK. Based on the resolutions of the June Plenum of the TsK KPSS, the military medical service will have to do considerable work in incorporating new synthetic materials for medical purposes. Work on the application of the new synthetic materials should be accomplished primarily in the following areas: the search for rapid-hardening materials for immobilization of extremities in cases of fractures as well as material for gluing bones together in fractures, material which would possess adhesive properties, be resistant to the effect of chemical agents and inert with respect to the body tissues; a search for material for preparing vascular prostheses, skull-defect prostheses and chest cage prostheses and surgical suture material posessing good mechanical strength and elasticity; the development of unbreakable glass vessels and packing containers in place of the glass ones, articles of medical and sanitation equipment as well as articles for the nursing care of the wounded and sick; the incorporation of new synthetic wetting materials into practice which improve and accelerate the laundering process. The attention of the scientific research medical institutions, of the Military Medical Academy, and of all the medical service officers should be fixed on these problems.

The Soviet government at the present time is able to expend considerable funds and materiel for the development of light industry without prejudice to the preferential development of heavy industry. The Plenum of the TsK discussed the results and perspectives of the development of the textile industry. Measures worked out by the Plenum of the TsK for the further expansion of the textile industry are of importance for satisfying the needs of the population for fabrics and clothes. Capital investments in the textile industry for the current seven-year period have been increased by 2.8 times in comparison with the previous needs, for 1952-1958.

In directing the most serious attention to the problems of control and checking of accomplishment, the Plenum

of the TsK KPSS approved the measures worked out by the Presidium of the TsK KPSS for increasing the part of the party and governmental apparatus both centrally and on the spot, for increasing the control over the accomplishment of the resolutions by the party and government in all branches of the government, party, administrative and other organizations.

The Plenum of the TsK KPSS has appealed to the entire working class of the Soviet Union as follows: widen the scope of the entire national socialistic race for fulfillment of the Seven-Year Plan before time, for technical progress; strive toward a high degree of productivity of labor, comprehensive mechanization and automation of the industrial processes, against conservatism and stagnation and backwardness in technics. The Appeal calls for a bolder incorporation of new equipment, the modernization of existing work benches and machines, the perfection of technological processes, the better utilization of productive capacities and reserves, economy in the large and small in every branch of industry. The Appeal by the Plenum of the TsK calls for the development of progressive science, the mastery of new technical equipment, the more extensive incorporation of the experience of the leaders in the race, the development of mass progress on the part of inventors and efficiency experts.

In calling on the people to develop even more extensively the entire national socialistic race for premature fulfillment of the Seven-Year Plan and for technical progress, the Plenum of the TsK of the party says in its Appeal to male and female workers, to male and female kolkhoz workers, to the Soviet intelligentsia, and to the entire working class of the Soviet Union: our party, as always, is doing this in the name of improving the life of the people, multiplying its material and spiritual riches, in the name of the further strengthening of the power of the socialistic Fatherland.

The Soviet people is very sure that under the leadership of its tried-and-true leader, the Communist Party of the Soviet Union, the magnificent creation of communism will be advanced by the heroic labor of the Soviet people. The Soviet glorious Armed Forces stand on guard for the peaceful, creative labor of the people. Rallied solidly around the leader and organizer of all the Soviet triumphs--the Leninist Communist Party--the Soviet People is advancing confidently toward the victory of communism along the road lighted by the historic resolutions of the Twenty-First Congress of the Communist Party of the Soviet Union.

Antiepidemic and Hygienic Work in the Soviet Army and Navy

The decisions of the June Plenary Session of the Central Committee of the Communist Party of the Soviet Union concerning the technical progress in all branches of the national economy are aimed at the most rapid fulfillment of the tremendous tasks of the construction of communism which were set down by the Seven-Year Plan.

The Seven-Year Plan for the Development of the National Economy of the USSR reflects the great concern that the Party and the government show for the welfare and happiness of the Soviet people.

The majestic program for creating the material and technical base for communism and for improving the welfare of our people creates exceptionally favorable conditions for the further success of Soviet public health. The state expenditures directed toward the protection of the Soviet people will be about 360 billion [thousand million] rubles during the seven-year period. This is completely unprecedented. The unprecedented scope will also extend to housing construction. Fifteen million apartments will be constructed in cities and workers' settlements, and about seven million homes in rural areas. There will be a considerable improvement in the sanitary conditions in urban and rural areas and an increase in municipal planning.

Thanks to the tremendous success of socialist construction, the rise in culture, and the fundamental improvement in the living conditions of the Soviet people, and as a result of the rapid development of medical science and public health, many of the factors that lie at the basis of the infectious disease rate have been eliminated. This success has made it possible to eliminate in the USSR such infections as plague, cholera, smallpox, and relapsing typhoid.

At the present time, there are favorable conditions for the sharp reduction, as well as the subsequent elimination, of other infectious diseases.

All the public health workers are confronted with the tremendously important task of achieving a considerable reduction in the infectious disease rate and of eliminating certain nosologic forms. Soviet public health has all the prerequisites for the complete elimination of typhoid, or at any rate for the sharp reduction of the disease rate to individual sporadic cases. It is planned to lower the dysentery rate in the country considerably. In March 1959 a collegiate board of the Ministry of Public Health USSR approved a plan for measures to reduce and eliminate certain infectious diseases. A special committee for assisting the

elimination of infectious diseases in the USSR was formed and made subordinate to the Presidium of the Academy of Medical Sciences USSR.

Thanks to the daily concern shown by our Party and the government for the Armed Forces, the military medical service has at its disposal everything that it needs for the successful solution of the tasks of the antiepidemic and hygienic support of the troops.

It has skilled cadres of hygienists, epidemiologists, microbiologists, virusologists, and infectologists and the necessary apparatus for the utilization of the latest laboratory methods and the carrying out of scientific work. The necessary material prerequisites for the successful search for new research methods and their further improvement have been created.

The military medical service has all the requirements for reinforcing the certain results that have been achieved to reduce the infectious disease rate in the army and navy. There is every justification for giving the military medical service the task, within the next few years, of eliminating dysentery as an epidemic disease throughout the army and navy. This task is a very complicated one, but it is completely realizable. In order to fulfill this task it is necessary primarily to put an end to the underestimation of the importance of preventive and antiepidemic measures, which are sometimes carried out poorly and too late. Individual troop physicians and epidemiologists have still failed to understand completely the epidemiological danger of dispersed microfoci of dysentery and are not taking effective measures to ascertain all the epidemiological links, the discovery of which would be the basis for developing a concrete system of measures to reduce the disease rate.

The underevaluation of the epidemiological importance of microfoci lies in the untimely realization of antiepidemic measures in the units and to a reduction in their effectiveness. All the work of preventing infectious diseases in the troops can be carried out successfully only if there is a good analysis of the epidemic situation and on the basis of concrete plans that have been worked out with a consideration of the specific conditions and peculiarities of each garrison. Epidemiological analysis that is carried out promptly and on a high scientific level will make it possible to organize efficiently and well-directedly an entire complex of antiepidemic measures. However, not all physicians know how to carry out complete epidemiological research or to give an exhaustive analysis of the reasons for the inception and

spread of a disease. The task consists in considerably improving the quality of epidemiological analysis, in teaching the military physicians how to carry out an independent analysis of the reasons for the inception of infectious diseases and to make timely use of the necessary measures to prevent their spreading among the troops.

It is necessary to continue, in the most active manner, the search for better and faster methods of bacteriological diagnostics of dysentery, taking into consideration the variability of its pathogenes, and to make wider use in laboratory practice of the method of the phage titer increase and of luminescent microscopy.

One of the important problems for the military medical service is the prevention, among the troops, of cases of epidemic hepatitis (Botkin's disease).

During the past five-six years in almost all countries of the world there has been noted a tendency to the intensive increase of the rate of this infection. A rise was also noted in the USSR, especially in 1956-1958. In Soviet Armenia the 1958 rate of epidemic hepatitis was not higher than the 1957 rate, but in individual garrisons (Nebit-Dag, Baku, etc.) the number of cases of this disease increased somewhat.

Epidemic hepatitis is basically characterized by the same natural laws that govern intestinal infections. Epidemiological observations show that sporadic cases of Botkin's disease are linked chiefly with the everyday-contact method of transmitting the disease. The alimentary method of spreading the disease not infrequently involves a large number of persons in the epidemic process, causing the development of epidemic outbursts of considerable intensity. Therefore, the preventive measures for infectious hepatitis are basically the same sanitation and antiepidemic measures as those for other intestinal infections.

In addition to the general sanitation and hygienic measures for preventing epidemic hepatitis, it is necessary to make wider utilization of gamma globulin. Despite the apparent contradictory information about the effectiveness of this preparation when used in cases of epidemic hepatitis, the use of it for this purpose nevertheless attests indisputably to positive results. The administration, for example, of a six-milligram dosage of gamma globulin to persons who have come in contact with persons having epidemic hepatitis results in a disease rate that is seven-eight times less than that of persons who have not received the preparation.

In the structure of the general and infectious-disease rate of the troop personnel there still is a considerable proportion of grippe-like and acute respiratory diseases.

Their etiology is varied, the clinical forms of manifestation are dissimilar, and there are not yet any means of specific prevention or therapy. It has appeared that the working out of the problem of the specific prevention and therapy of acute respiratory diseases should have attracted the special attention of the appropriate specialists in the military medical service. These questions, however, are obviously being studied insufficiently.

In particular, when studying the problem of grippe and acute respiratory diseases, in addition to the use of well-known diagnostic methods (RGA, RSK, rhinocytological method, etc.), it is necessary to make wider use of tissue cultures. It is possible to recommend the more frequent utilization of the hemadsorption method which, according to data in the literature, has advantages over RGA and other methods of indicating grippe viruses, especially the A, A_1, and B types. Sanitation and epidemiological detachments of the districts and the sanitation and epidemiological laboratories of the fleets must master the methods of obtaining this reaction and make a complete determination of its practical value for diagnostic work among the troops.

When studying acute respiratory diseases it is necessary to consider the fact that a definite number of this group of infections are etiologically linked with adenoviruses. The material that has been accumulated in foreign literature attests to the high frequency of adenovirus diseases, especially among persons newly taken into the service. This cannot be ignored in practical work and therefore it is necessary to collect material and grow cultures from it with a consideration of the possibility of also isolating adenoviruses. In this instance a large amount of help can also be rendered by the method of tissue cultures. By relying on the achievements of medical science in the field of combatting grippe and preventing that disease, as well as the very rich experience of the military medical service that was obtained during the 1957 grippe pandemic, it is necessary, even during the future, to improve our system of antigrippe measures among the troops.

It is necessary to develop more widely the scientific research work to study the basic factors determining the rate of grippe and acute catarrhs of the respiratory tracts in the army, and to intensify medical control over the organization and carrying out of an efficient system of physical hardening of the troops.

There is still another group of still poorly studied infections -- diseases caused by intestinal viruses (EKhO enteroviruses and the Soxsackie viruses). Although these

viruses have been isolated from the gastrointestinal tract of patients, they are capable of causing cases of pharyngitis, agina, so-called aseptic or serous meningitis, and other diseases. Insufficient acquaintance of military physicians with enterovirus infections makes it impossible for them to diagnose these diseases correctly. Many of these diseases remain unrecognized or are considered to be cases of grippe, acute catarrhs of the respiratory tracts, etc. In 1958 such diseases were observed among the public in the territory of the Turkestan Military District, the Odessa Military District, and in 1959 in a small number among the servicemen of the Far Eastern Military District and the Pacific Fleet. Certain virus strains isolated from the patients indisputably belong to the enterovirus group. The study of the peculiarities of the clinical appearance, epidemiology, and prevention of enterovirus infections is therefore becoming one of the tasks of military physicians, especially since, at the present time, many questions linked to study of the epidemiology and prevention of enterovirus diseases have still been unresolved and require complete study (the mechanism of the transmission of enteroviruses, the duration of immunity after recuperating from the disease, and other questions).

Varied epidemiological study of such diseases will result in a clearer understanding of the complex processes of the interaction between viruses and the human organism, and this will help to find efficient methods of combatting and preventing the diseases caused by the enteroviruses.

It is necessary to solve this problem by the combined method, by the participation of infectologists, epidemiologists, virusologists, and other specialists. Where possible, it is necessary to establish a link with regional institutes of epidemiology, microbiology, and hygiene which have virusological departments and which are sufficiently equipped with sets of diagnostic sera and antigens. The initiative in this matter must belong entirely to the chiefs of the virusological laboratories of the SEC's [sanitarno-epidemiologicheskiy otdel -- Sanitation and Epidemiological Department].

As a result of the fact that the Armed Forces have been greatly supplied with technical means, the hygienic support of the troops is changing and becoming more complex. At the present time, the primary importance is being given to the study of the sanitary working conditions of military specialties, especially ways of protecting the personnel from the harmful influence of certain types of apparatus and devices, for example, at radar stations, and when handling modern types of special fuel.

An important place in the work of military hygienists and military physicians is occupied by questions of the carrying out of medical control over the quality of nutrition and its physiological merits. Control over the vitamin content of prepared food, the protein value of the daily ration, and the correct ratio of mineral salts in it must now be carried out not only from the position of the over-all need of the organism, but also with an obligatory consideration of the peculiarities of military labor and climatic conditions. It is necessary to increase and to improve considerably the medical control of the nutrition of officers, members of their families, and workers and employees of the Soviet Army and Navy.

In conformity with the decree of the Central Committee CPSU and the Council of Ministers USSR, "The Further Development and Improvement of Public Nutrition," an order of the Minister of Defense USSR set down concrete measures for the improvement of the nutrition of officers, members of their families, and workers and employees of the Soviet Army and Navy. A great amount of importance is being attached to measures to improve the quality of the food prepared and to improve the service and sanitary conditions of the dining rooms serviced by the Main Administration of Trade, Ministry of Defense.

By increasing its personal responsibility, the entire medical staff, in addition, is obliged to strive for a situation in which there will be a sharp increase in the demands made upon the workers engaged in public nutrition to observe sanitary conditions for the preparation of food, as well as an intensification of the control carried out by workers in the food service for the sanitary conditions of the enterprises engaged in public nutrition. It is necessary to develop sanitation-education work among the workers engaged in public nutrition, in order to teach them the principles of the physiology and hygiene of nutrition and the prevention of toxic infections caused by food. In the districts and in the fleets the medical service must provide for practical assistance to the administrations of trade in the training of skilled cadres of chefs and dieticians.

Great and responsible tasks confront the epidemiologists and hygienists of the Soviet Army and Navy. Their duty is to strengthen, in every way and constantly, the antiepidemic and hygienic work in the army and navy. They have all the opportunities for coping outstandingly with these tasks.

The Organization of First Aid to the Wounded, Gathering Up of the Wounded, and Evacuation in Modern Offensive Battle

N. V. Kruglikov, Colonel of the Medical Service
G. T. Ivanov, Lieutenant Colonel of the Medical Service, Candidate of Medical Sciences
Docent Ye. I. Ignat'yev, Lieutenant Colonel of the Medical Service

One of the most complicated problems in the organization of medical care of the small and large military units in modern battle is the timely rendering of first aid to the wounded on the battlefield, gathering them up and evacuating them to stages of medical evacuation. This problem, despite the great attention given it on the part of small and large unit commanders and the corresponding medical service chiefs, was not conclusively solved even in the concluding phase of the Second World War, which had an effect on the time that the wounded arrived at the stages of medical evacuation. Thus, according to the data of "Experience of Soviet Medicine in the Second World War 1941-1945," 61.7 percent of all the wounded were admitted to the battalion medical aid station two hours after being wounded in the Berlin operation. In the same operation, 64.8 percent of the wounded were admitted to the regimental medical aid station in the first four hours after being wounded. As a number of authors has pointed out (Burnazyan, Banaytis, Zvorykin, Zalkind and others), the first aid that was rendered was not complete in many cases.

While during the past war such figures did not satisfy the medical service, under current conditions they are simply inacceptable by virtue of the considerably increased tempos of advance of the troops and the complexified conditions under which they are gathered up and evacuated. All this has pointedly posed the problem of the need for working out the most expedient forms of organization of rendering first aid, gathering up and evacuating the wounded, which has required a further study of this problem.

In the present article, material obtained from research applied to conditions of modern offensive battle is being generalized. The investigations were carried out in three stages. In the first stage a study was made of the working conditions and the possibilities of the sanitation detachments of companies, litter bearers and ambulances for rendering first aid, gathering up and evacuating the wounded under the system generally accepted at the present time. The investigation was carried out in the field. With the aim of complete study of the problems posed the arbitrarily afflicted persons were furnished with special imitation tags indicating the time

and the nature of the wound as well as with a list of specific measures which were to be accomplished in rendering first aid and aid prior to being seen by the physician. The operation of the aid men, litter bearers, and feldshers of the battalion medical aid station and the time of admission of the wounded to the battalion medical aid station were clocked, and the results of the timing were written down on the imitation tags.

Treatment of the material of the investigation, which was accomplished with respect to a considerable number of arbitrarily afflicted persons, revealed the following. From 7 to 30 minutes were required for rendering first aid to the litter wounded, depending on the nature of the wound; in 20 percent of the cases this time amounted to more than 10 minutes. In connection with this, the aid man inevitably fell back behind his unit and was not able to observe the battlefield. This circumstance led to the fact that part of the wounded were not found and did not receive first aid in time.

The gathering up of the wounded by the litter units was carried out, as a rule, on the axis of displacement of the battalion medical aid station. In certain cases, when the wounded persons were arranged in groups they were concentrated in shelters near the place they were wounded. From here the wounded persons were taken out by the battalion ambulance to the place of operation of the battalion medical aid station. With this kind of organization of gathering up of the wounded the litter bearers also became separated from their units and lost connection with the company aid men.

The battalion medical aid station worked "with the stream," making stops at places where the wounded were concentrated. During the rendering of care by the battalion medical aid station feldsher before the patient was seen by the physician the ambulance was used for bringing the wounded from shelters which were located near the battalion medical aid station. This made it possible to concentrate up to eight to ten wounded persons in places where the ambulance stopped. Giving aid to such a group of wounded persons, prior to being seen by the physician, required, on the average, about one hour. Therefore, the battalion medical aid station ultimately also fell back a great distance behind its unit, which markedly lengthened the times needed for rendering aid to the subsequent wounded persons before being seen by the physician.

Therefore, at the first stage of investigation it was shown that the narrowest link in the system being analyzed is the rendering of first aid to the wounded and their evacuation from the battlefield.

The second stage of the investigation was devoted to a study of the possible variants in the organization of

gathering up the wounded and the evacuation of them in modern offensive battle with the aim of detecting the most effective of them. At the given stage the investigation was carried out on maps.

The zone of advance of the regiment was plotted on a large-scale map, where on the basis of the study made the wounded were located. At the upper edge of the map the time was designated at which the regimental battalions occupied successive lines. Here, the tempo of advance of the battalions during the period of breakthrough of the enemy's battle position was assumed to be uniform.

The time that the wound occurred was established as applied to the time that the company combat formation was at the given line. Since it was impossible by this method to determine the actual duration of the operation of rendering first aid to the various wounded persons, a single time standard was accepted as necessary for rendering aid to all the litter wounded. Such single standards were also accepted in all cases with respect to the rate of advance of the litter units, the times of rendering aid before being seen by the physician and the rate of advance of the ambulance.

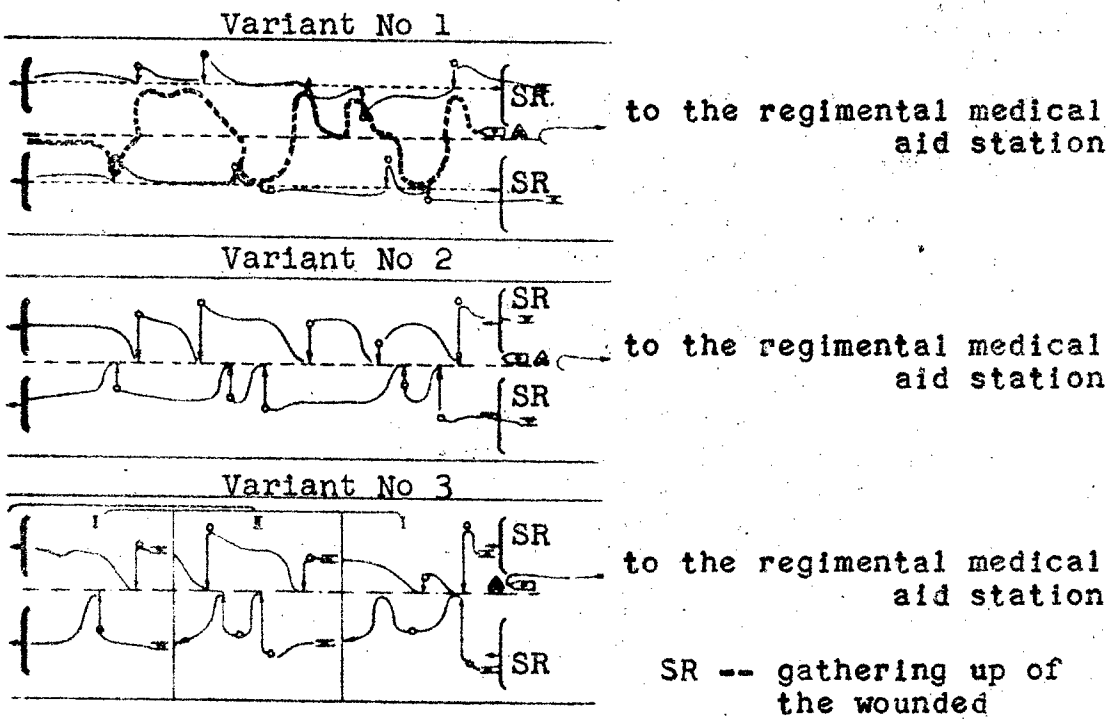
For the purpose of obtaining comparable results, the number of aid men, litter bearers and ambulances occupied in rendering aid, gathering up and evacuating the wounded was made the same, in addition to the same tactical background, disposition and number of the wounded, as well as standards of rendering first aid and rate of movement of the medical personnel used.

In all cases the movement of the litter bearers and of the ambulance was made in shortest directions. For the purpose of determining the influence of the organization of gathering up the wounded alone on the times of their arrival at the medical aid station the investigation was accomplished prior to the movement of the regimental medical aid station from its original position to a new area. The following variants (Fig. 1) were analyzed.

Variant 1. The wounded were brought out on litters on the company axis of gathering up the wounded, which coincided with the direction of advance of the company. Subsequently, they were concentrated on the axis of displacement of the battalion medical aid station, for which purpose the battalion ambulance was utilized. At the battalion medical aid station the wounded were given aid before being seen by the physician and evacuated to the regimental medical aid station.

Variant 2. The litter units brought the wounded out on the axis of displacement of the battalion medical aid station, which also coincided with the direction of movement of

the battalion. Here, the wounded person, with the approach of the battalion medical aid station, received aid before being seen by the physician, and subsequently he was evacuated to the regimental medical aid station.



Key

----- company axis of gathering up the wounded
--- axis of displacement of the battalion medical aid stations
--- axis of displacement of the ambulance
—— route of the litter units
····· route of the ambulance
◦ wounded persons
⊕ ambulance

Fig. 1. Variants of Gathering Up the Wounded by Hand.

Variant 3. The litter bearers gathered up the wounded according to areas. For this purpose the whole zone of advance of the regiment was divided into several sectors and distributed among groups of litter bearers. Each group gathered up the wounded within its area and brought them to the axis of displacement of the ambulance. After concluding the work in a single area, the group passed into a new area, leapfrogging through sections reinforced by other litter bearers.

In subsequent variants -- 4 and 5, methods of organization of gathering up the wounded were analyzed with the use of mechanized means of transport by the litter bearers (Fig. 2). Here, the number of personnel occupied in gathering up and evacuating the wounded did not change, because it was arbitrarily considered that each litter bearer knew how to drive an ambulance.

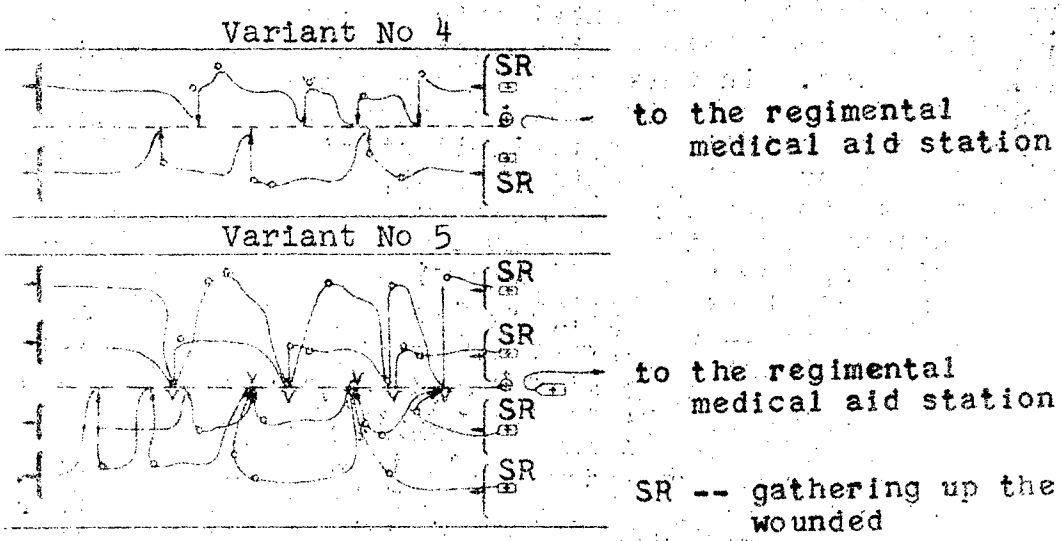


Fig. 2. Variants of Gathering Up the Wounded With the Application of Mechanized Facilities.

An investigation of the possibilities which might be given by the mechanized facilities for gathering up the wounded was undertaken in connection with the fact that many authors (Leonardov, Oppel' and others) have long ago pointed out the expediency of applying them to the evacuation of the wounded from the battlefield. Specifically, V. A. Oppel' wrote: "The problem of the very rapid evacuation of the wounded from battlefields is an important problem. It seems to us that it cannot be solved by litter-bearer groups of persons. The mechanization problem should play its part here." (V. A. Oppel'. Outlines of War Surgery. Medgiz. 1940, page 238.) Taking this into consideration and in the belief that the real need and possibility of mechanizing the work of the litter bearers had

come about, we decided to check two variants of organization of the gathering up of the wounded with the use of ambulances [the actual Russian words here are "medical personnel carriers"].

Variant 4. Gathering up the wounded by means of mechanized facilities was carried out on the axis of displacement of the battalion medical aid station.

Variant 5. Evacuation of the wounded by ambulance was carried out on the regimental axis of gathering up the wounded, which passed between the battalions of the first regimental echelon. In this case, the rendering of aid to the patients of the type given before they are seen by the physician by the battalion medical aid station, to which the wounded were not brought in this variant, had to be worked out along the regimental axis of gathering up the wounded.

As indices permitting the comparison of the efficacy of these variants, the times of arrival of the wounded at the battalion medical aid station, feldsher were used (and in the fifth variant -- the time of arrival at the feldsher working on the regimental axis of gathering up the wounded), as well as the time of arrival at the regimental medical aid station. Data obtained in the investigation of all these variants were analyzed and are presented in the Table.

An analysis of the data of the Table as well as other material of the investigation showed the following. In the absence of mechanized facilities for gathering up the wounded the times needed for rendering aid before being seen by the physician and for arrival of the wounded at the regimental medical aid station were minimal when they were carried out on the company axis of gathering up the wounded with subsequent transportation to the battalion medical aid station by ambulance (Variant 1). In this variant the load on the litter unit was the least because of the full utilization of the battalion medical aid station ambulance. However, it will not always be possible to use this variant under actual conditions, because the presence of trenches, mine fields, etc., in the zone of advance does not permit the machines to run freely.

The transportation of wounded on the axis of displacement of the battalion medical aid station (Variant 2) in comparison with Variant 1 increases the load on the litter bearers by 2.4 times through a reduction in the useful work of the battalion medical aid station ambulance. In connection with this, the times needed for rendering aid before being seen by the physician were increased by two times, and the time of arrival of the wounded at the regimental medical aid station was lengthened by 1.2 times. The observation showed also that considerable time was lost in

carrying the wounded over great distances (600 meters or more). As a result the real danger was created that the wounded who were at the battalion flanks would not receive aid before being seen by the physician, because they cannot be carried out to the axis of displacement of the battalion medical aid station when the battalion medical aid station has already passed this place.

Comparative Characterization of the Various Methods of Organization of Transportation, Gathering Up and Evacuating the Wounded

Organizational variants	Time elapsing from wounding to arrival of a single wounded at						Traversed by the litter unit with the wounded (in % of total route)	Traversed by battalion medical aid station ambulance with wounded (in % of total route)	Work of regimental medical aid station ambulance	
	battalion medical aid station (in minutes)			regimental medical aid station (in minutes)						
	minimum	maximum	mean	minimum	maximum	mean			Trips made	Average number carried
Variant 1 Transportation on litters on company axis of gathering up the wounded	30	43	36	64	195	129	6.5	31.4	3	2.5
Variant 2 Transportation on litters on battalion axis of gathering up the wounded	21	160	72	55	246	157	15.6	23.3	4	1.9
Variant 3 Gathering up the wounded by areas	21	106	66	55	215	135	15.6	23.3	4	1.9
Variant 4 Transportation by ambulance on battalion axis of gathering up the wounded	27	31	29	62	177	117	-	-	3	2.5
Variant 5 Transportation by ambulance on regimental axis	43	35	73	155	111	-	-	-	2	3.8

Gathering the wounded up according to areas (Variant 3) results in the same load on the litter bearers because they are working in a limited area as well as because of the possibility of including several groups of litter bearers in the work simultaneously in different areas; the time needed for rendering aid to the wounded before being seen by the physician and for their arrival at the regimental medical aid station was somewhat reduced by comparison with Variant 2. The given organization of gathering up the wounded can produce the best results when there is an approximately equal number of wounded in the sections of each group of litter bearers, which can hardly be anticipated under actual conditions. In addition, the absence of a relationship between the groups of litter bearers and the sanitation detachments of the companies in Variant 3 complicates the search for the wounded, because the possibility of calling out the litter units to the place of shelter of the wounded persons by the established signals is excluded.

The utilization of mechanized facilities for gathering up the wounded (Variants 4 and 5) makes it possible to reduce the time needed for rendering aid to the wounded before being seen by a physician and time needed for their arrival at the regimental medical aid station considerably. Here there is no need to drag the wounded person, shelter him and mark the place where he is, because the rapid rate of advance of the ambulances makes it possible to approach the wounded person at the times when the aid man is giving him assistance. Not uncommonly, the litter bearers arrive at the place where the wounded person is at the same time as the aid man designated in the platoon, which makes it possible to render first aid directly in the ambulance.

By making use of the mechanized facilities for gathering up the wounded, larger "nests" of wounded may be created, which has a beneficial influence on the work of the regimental ambulance (Variant 5).

As experience has shown, the time needed for arrival of the wounded at the regimental medical aid station with the use of mechanized facilities of gathering up the wounded is shorter the fewer the axes of gathering up the wounded in the zone of advance of the regiment. Therefore, the best results were obtained in Variant 5, in which only one axis of gathering up the wounded was used in the regiment. However, the use of Variant 5 requires a reorganization of the manner of rendering aid to the patient before being seen by the physician. Specifically, the site of rendering this type of aid must be shifted from the battalion medical aid station, to which the wounded persons are not brought in this variant,

to the axis of displacement of the regimental medical aid station ambulance, where the reloading of the wounded occurs from one type of transportation (medical personnel carrier) to another (ambulance). [The terms "medical personnel carrier" and "ambulance" have been used interchangeably in this article; actually, we would designate the medical personnel carrier a large ambulance.]

In the third stage of investigation some of the variants of organization of gathering up and evacuating the wounded described were checked under field conditions. Specifically, it was possible to check the variant of transporting the wounded on the litters on the company axis. The checking confirmed the reduction in time necessary for arrival of the wounded at the battalion medical aid and regimental medical aid stations in organization of the gathering up of the wounded according to the variant indicated. Along with this, the difficulties in utilization of it under certain conditions were shown. Thus, for example, the conditions of the locality did not always permit the ambulance to pass from one company axis to another. Under actual conditions it was difficult to establish the company axis of gathering up the wounded in the locality. Therefore, depending on specific conditions, recourse had to be had to a combination of the first and second variants of organization of gathering up the wounded.

A certain experience was obtained also in connection with the utilization of mechanized facilities for carrying the wounded. This experience confirmed their considerable advantages: the search for the wounded was facilitated, the times needed for bringing them to the regimental medical aid station and battalion medical aid stations were shortened, the aid men and litter bearers did not fall back behind their large units, etc. All this speaks for the fact that equipping the litter bearers with mechanized facilities for gathering up the wounded is an inherent necessity.

Conclusions

1. In the absence of mechanized facilities for carrying the wounded it is most expedient to carry the wounded along the company axis of gathering up the wounded with subsequent collection of them by an ambulance on the axis of displacement of the battalion medical aid station. Only in the absence of such a possibility (very rugged terrain, etc.) do we permit the carrying of the wounded along the axis of displacement of the battalion medical aid station.

2. Gathering up the wounded by areas is more conveniently applied to the rear areas when there is no need for a constant connection with the forward troop echelons.

3. The application of mechanized facilities for gathering up the wounded best satisfy the nature of current offensive battle, but here essential changes need to be introduced into the organization of rendering first aid and aid to the patient before being seen by the physician. [First aid is aid given by an aid man; "aid before being seen by a physician" is that rendered by feldsher.] Specifically, in many cases aid before being seen by a physician has to be rendered by the regimental unit of the medical service.

The Rendering of First Aid and the Extraction of Injured Crew Members from Self-Propelled Artillery Mountings

S. I. Belov, Colonel of the Medical Service

The conditions under which they are operating, particularly the nature of the battle operations of tank units, the characteristics of the structure of the casualties among the crew members, the characteristics of displacement of those injured inside the fighting machines and the limited possibilities for aid men to enter the self-propelled artillery mountings through the small hatches exert an essential influence on the work of the medical corps in rendering first aid to crew members of self-propelled artillery mountings (SAU) injured on the battlefield. (See V. A. Shabalin's article in "VMZh" No 3, 1959.) For the purpose of rendering first aid and extracting the injured crew members medical workers should be able to get into the self-propelled artillery mountings on the battlefield, remaining unnoticed by the enemy, to orient themselves inside the machine, to handle the instruments and mechanisms skillfully, to know the efficient methods of giving first aid and the gentle methods of extraction of the wounded under such conditions. When the SAU is in a shelter out of range of the enemy fire, more favorable conditions are created for rendering first aid and extracting the injured. Serious difficulties for the work of the medical personnel arise in those cases where the self-propelled artillery mounting is located in the area of enemy fire.

On approaching the damaged self-propelled artillery mounting the aid men should attentively examine the nearby shelters (pits, shell holes, trenches, foxholes, etc.) in which the crew members may be put after leaving the machine and where first aid can be given to the injured. If the first aid is given by self- and mutual-aid the applied dressings, splints, tourniquets are checked, and, where necessary, they are fixed. The slightly injured crew members should assist in the extraction of their seriously wounded comrades from the fighting machine. If the injured persons are located inside the self-propelled artillery mounting the aid man (or sanitary instructor) enters the machine, capably eluding the observation of the enemy and protecting himself from enemy fire by the body and turret of the SAU. From the stern or side of the machine sheltered from the enemy the aid man raises the hull roof plate of the motor compartment, crawls along the hull roof plate (on his side, or on all fours) to the turret of the SAU and opens the hatch cover with a special key. Entry into the self-

propelled artillery mountings SU-152 and SU-100 is accomplished through the broad and free common hatch (Fig. 1) and into the self-propelled artillery mounting SU-122 through the hatches of the loader or machine commander. The other hatches of these machines do not provide reliable shelter for aid men working on the battlefield.

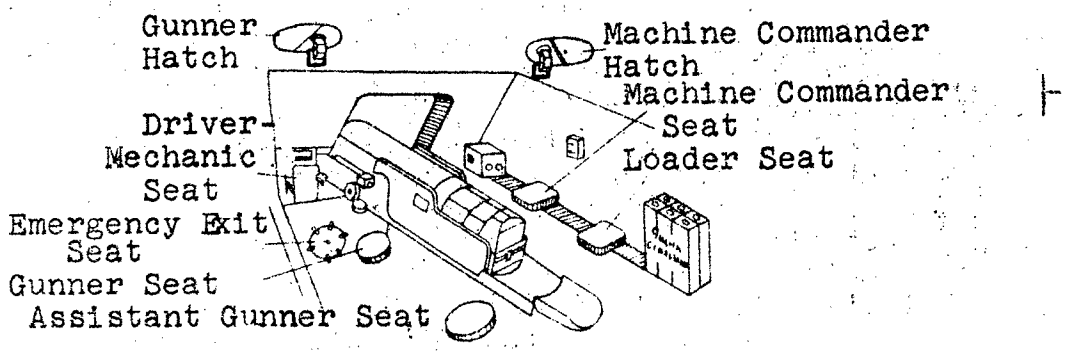


Fig. 1

The rendering of first aid inside self-propelled artillery mountings is associated with difficulties (small size of the inside of the machine, the need for changing the positions of the apparatuses and mechanisms, the semi-darkness in the daytime, the complexity of the approach to injured, the difficulty of removing the clothes or examining the places of injury and of applying dressings), which leads to a prolongation of the time needed for rendering first aid and to a certain reduction in the quality of the dressings, splints, etc. Despite this, the medical personnel should be able to render first aid to injured crew members inside the machine.

Inside the fighting machine the aid men, depending on the battle conditions, the severity of injury of the crew members and the condition of the machine, render first aid on the hull floor, at the place of work, or extract the injured to the outside and render the necessary medical aid in the nearest shelter.

The small size of the working places of the crew members as well as the presence of numerous projecting parts and mechanisms of the SAU require skillful and cautious handling of the injured persons in the machine by the aid men. Moving the wounded from seat to seat, from seat to hull floor, the extraction of the wounded and burned without preliminary rendering of first aid may cause a marked deterioration in their condition. A serious danger for the wounded arises in those cases where the aid men try to extract them from the fighting machines without stopping hemorrhage, without the simplest immobilization of

the fractures of the extremities or with open wounds, burns and without gas masks in a locality contaminated with poison gas, radioactive substances and bacterial agents.

When the battle situation is very complicated (artillery fire or conflagration of the SAU, threat of capture of it by an enemy, etc.) the injured should be extracted without rendering first aid. During the Second World War cases were noted where medical workers and comrades extracted the injured even from flaming tanks and self-propelled artillery mountings. Improvement in the design of the SAU, equipping them with fire-fighting equipment, it must be supposed, will lead to a reduction in the number of fires in the fighting machines, and, therefore, to a more opportune extraction of the injured from the fighting machine.

In those cases where the battle circumstances and the condition of the machine permit, a dressing and a tourniquet may be applied to seriously wounded persons even in the SAU; a gas mask may be put on, antidotes and analgesics may be administered, and the simplest immobilization of injured extremities may be accomplished. First aid may be rendered to the slightly wounded and those moderately wounded outside the machine, and artificial respiration is always best given after extraction of the injured from the machine, particularly when the self-propelled artillery mounting is in an unprotected place.

The high rate of movement, the impetus of the attack, the great maneuverability on the battlefield of tanks and self-propelled artillery mountings, the separation of the crew members, the limited number of aid men in tank units, etc., determine the greater part of self- and mutual-aid among tankmen in modern battle. First aid to the seriously wounded crew members should be given by their uninjured and slightly wounded comrades with the utilization of facilities of the tank pharmacy and individual dressing and antichemical packs.

In the SU-152 and SU-100 first aid may be rendered to the driver-mechanic by the gunner located behind him (Fig. 2) or the loader. The latter may render aid to the gunner sitting in front of him. First aid to the commander of the machine is most conveniently rendered by the number two loader. If the commander of the SAU is uninjured or if the number one loader is uninjured they assist the number two loader.

In the SU-122 the control compartment is located at the right side of the machine; therefore, the commander of the machine can render first aid quicker than the others to wounded driver-mechanic, and a wounded commander can be given

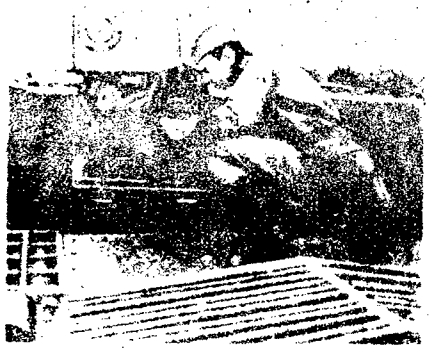


Fig. 2

aid best by the number two loader. The gunner and the number one loader work between the gun and the left side of the machine, and when one of them is wounded the other can immediately render assistance to his comrade. In putting a gas mask on injured crew members in the machine and application of dressings to the head, the aid man should first unfasten the laryngophone, take off the helmet, separate it from the interphone system, and after the dressing put it back on the injured person's head. All this requires twice as much time as it would outside the machine.

In the self-propelled artillery mountings SU-152 and SU-100, a definite sequence is needed in the work of aid men for rendering medical aid and extracting injured crew members from the machine. The apparatuses and mechanisms when arranged in battle position complicate the approach to the seriously wounded. The aid men in such cases should change the position of the machine assemblies (push the gun to the side and lower its shield, lower the back of the seat, etc.). At night and in the daytime, electric lighting should be turned on in the closed hatches, and if it is not working, pocket flashlights should be used.

After entering the SAU through the common hatch, the aid man first renders aid to the number one loader, who is usually located near the hatch when he is wounded, and extracts him. Then, moving forward somewhat, he assists the gunner. If two aid men are working simultaneously in the machine, one renders aid to the gunner and driver-mechanic, and the other goes behind the gun for the purpose of rendering first aid to the commander of the machine and to the number two loader. In order to render medical aid and to extract the driver-mechanic from the SAU-152 (or SU-100) the aid man pushes the gunner's seat to the side, turns the gun to the left as far as it will go; thereby, the breech end of it with the aiming and rotating mechanisms are pushed to the right. In this way, the approach to the driving compartment is cleared. After pushing the driver-mechanic's seat back and placing the injured person on it, the aid man takes the driver from behind under the armpits and drags him to the fighting compartment. After rendering first aid to the injured person on the hull floor of the SAU, the aid man together with his helper from the crew carries him to the common hatch along the side and extracts the driver-mechanic from the machine through it.

From the SU-152 (or SU-100) it is best to extract the injured crew members through the common hatch using two or three aid men and a Sh-4 strap, a litter strap or in an extreme case, by hand. When the injured crew members are located at their regular working places the seriously wounded loaders (located near the hatch) are the first to be removed through the common hatch; after that, the gunner, driver-mechanic and commander or first, the commander, and after him the gunner and driver-mechanic. Before removing the wounded commander from the machine and the number two loader through the common hatch the aid man lifts them from their places of work or from the hull floor of the tank, passes them through the enclosure and breech portion of the gun, and brings the head into the common hatch.

Crew members of the SAU who have injuries of the head, posterior surface of the trunk or buttocks are extracted from the machine head first and face down (Fig. 3), and wounded persons in whom the extremities, chest or abdomen are wounded are first placed on the healthy side or on the back. In extracting the seriously wounded from the fighting machine one aid man is posted behind the SAU turret and, leaning over into the common hatch, raises the injured person up, holding him by his healthy upper extremities, clothes or strap. The second aid man or a healthy crew member who is inside the machine supports the injured person by his lower extremities and, raising them up, directs him into the hatch. After placing the wounded person on the opened hull roof plate of the common hatch, he is gradually moved and let down on the cover of the motor compartment. Then, the first aid man lies on his side, takes the wounded person and places him on his own leg, which is bent at the knee and hip joints, and, taking shelter behind the turret of the SAU, moves the wounded person to the stern or side of the machine (Fig. 4). The second aid man at this time leaves the machine and standing on the ground he takes the wounded person from the first aid man. Together they pull the wounded person to the nearest shelter, from which he is to be taken by litter bearers or carried out by ambulances (or battle machines).

Fig. 3

After extracting a wounded crew member from the tank who has a fracture of the femur he is first given an analgesic; then the simplest immobilization of the extremities

Fig. 4

is performed, and the three of them leave the machine. Thereby, two persons are inside the fighting machine and support the wounded person by his pelvis, lumbar area and lower extremities on the healthy extremity side and carefully lift him up into the hatch with his face up. One aid man, who is near the hatch outside the machine, pulls the strap. Then the wounded person is carefully moved to the stern of the machine and let down to the ground.

In the case of enemy fire on the sides and stern of the self-propelled artillery mounting it is difficult for aid men to get into it and extract the wounded, and sometimes it is necessary to wait until the enemy fire stops or until the battle machine with its injured crew is brought to the nearest shelter by the members of a repair-evacuation group. In individual cases it is necessary for the medical personnel to cover the tanks and self-propelled artillery mountings with fire or with masking smokes. If there is solid ground or a shell hole, pit or trench under the machine, it is expedient to extract the injured persons from the SU-152 through the broad emergency exit hatch which is in the hull floor.

The front hatch over the place of work of the driver-mechanic of the SU-100 can be utilized for the extraction of injured crew members when the machine is facing with its rear toward the enemy and when the common hatch cannot be used. First, the driver-mechanic is extracted, because he is in the immediate vicinity of the hatch. The aid man who is inside the machine places the injured driver on the back of the seat and then directs his lower extremities into the hatch and they are taken by another aid man outside the SAU. Then, the first aid man takes the injured person by his armpits and directs him into the hatch; the second aid man takes him and carefully lets him down to the ground. After extracting the driver-mechanic, the aid men bring the other injured crew members to the front hatch and extract them from the machine.

In the self-propelled artillery mounting SU-122, the hatches of the machine commander and of the loader which are located in the hull roof plate of the turret are most convenient for extracting the injured persons. First extracted from the commander's hatch is the commander of the machine and then the driver-mechanic or loader after first

moving them from their places of work to the commander's seat in the SAU.

The injured persons are extracted by means of straps or without them with their heads up by two aid men. The aid man who works inside the machine directs the injured person upward, putting his head into the opening of the hatch by holding the patient with his right hand by his belt and grasping his thigh with his left hand. The second aid man, standing at the right side behind the turret of the machine and leaning into the hatch, elevates the wounded person by the ends of the strap or under the armpits. After raising the injured person outside of the hatch through the opening he places him with his abdomen (or chest) on the hull roof plate of the turret and then moves him to the right side or stern of the battle machine. During the work, the aid men and injured person are sheltered from observation and enemy fire by the raised hull roof plate of the hatch and turret of the machine.

The greatest difficulties arise in rendering medical aid and extracting the driver-mechanic. The aid man, approaching the wounded driver-mechanic who was in the driving compartment from the rear, lets him down onto the back of the seat which has been thrown back, gives him first aid, and then moves him to the fighting compartment, and along with the other aid men raises him to the place of work of the machine commander. Thereby, one aid man holds the wounded person under his armpits, and the other one, standing on the side, supports him by his legs. With the aim of widening the space between the gun and the right side of the machine for convenience in the work of the aid men the gun is rotated to the right as far as it will go. The sequence of extraction of the driver-mechanic and loader through the commander's hatch is the same as that for the commander of the machine.

Loader number one and the gunner of the SU-122 are most conveniently extracted through the loader's hatch which is nearest to them. One aid man is located inside the machine; the other works outside near the hatch behind the turret. After raising the injured person into the hatch the aid men place him (depending on the localization of the wound) on his abdomen, chest or back on the hull roof plate of the turret, and then carefully let him down on the roof plate of the motor compartment, move him to the stern of the machine and let him down on the ground. In the event of enemy fire on the stern or sides of the SU-122 the wounded crew members may be extracted through the emergency exit hatch or through the turret hatches after bringing the machine to the nearest shelter. If the fighting machine with

its injured crew members is in a shelter or in the rear of friendly troops and is not exposed to enemy fire, the aid men can calmly render aid and extract the injured persons from the machine through the free hatches nearest to them.

In the SU-152 (or SU-100) the machine commander is extracted from his seat by means of straps through the commander's hatch, and the loaders, gunner and driver-mechanic are extracted through the common hatch by the methods described above. In a modernized SU-152 model, the number two gunner can be extracted from the machine through the spare loader's hatch which is located above his place of work.

The injured driver-mechanic is brought out of the SU-122 through his own hatch; the machine commander and the number two gunner are taken out through the commander's hatch; and the gunner and number one loader are taken out through the loader's hatch. The use of mass attack weapons by the enemy considerably complicates the work of the medical personnel in rendering aid and in extracting the injured crew members from fighting machines. When the aid men and sanitation instructors work in antichemical protection equipment (gas mask, stockings, gloves, apron) entering the fighting machines, orientation inside the SAU, the rendering of aid to the wounded as well as the extraction of injured crew members are complicated.

With the aim of rapidly bringing the medical personnel wearing antichemical protection equipment into a region where there has been an atomic explosion and with the aim of protection of the personnel against the effect of ionizing radiation, rescue commands should be sent into the focus by armored transport (tanks, armored cars, self-propelled artillery mountings, armored truck tractors, etc.) rather than by foot. This makes it possible to traverse the destroyed areas in the locality more quickly, and to evacuate the injured from the area with a high level of radiation in the shortest possible time.

In a focus of an atomic explosion the first aid to the injured tank men should be begun from the epicenter of the explosion and in places with maximum radiation levels. The crew members located in sheltered and unsheltered fighting machines in the vicinity of the epicenter sustain extremely severe and severe combined afflictions and will need the quickest possible medical aid. The shock wave, spreading with great rapidity and force, penetrates into the openings of the fighting machines and produces injuries and burns of the crew members. Those injured may also be buried near the fighting machines or under them in destroyed shelters. Therefore, a preliminary, sometimes quite prolonged

digging up of caved-in structures and a skillful extraction of the wounded is required. A high radiation level in the region of the epicenter of the blast causes irradiation of the injured persons located outside the fighting machines and, therefore, causes a worsening of their condition, which would be serious even without this.

In the focus of the atomic explosion as well as in a locality contaminated with radioactive substances, medical workers should first render first aid to those seriously wounded crew members who are located outside the fighting machines. They should first be evacuated from the contaminated locality. If for any reason the evacuation is delayed, the injured persons in the fighting machine should be sheltered for the purpose of protecting them from the effect of ionizing radiation. Then, medical aid is given to those wounded persons who are inside the fighting machines, because the extraction of the wounded and burned without rendering aid undoubtedly leads to a contamination of the wounds and burns with radioactive substances.

The injured persons should be extracted from the SAU and removed from the machine to the side opposite to the epicenter of the atomic explosion, keeping in mind the fact that parts of the machine which face the epicenter of the explosion may be splashed with considerable radioactive cinders and dust, and a considerable induced radiation occurs in the tracks. The injured persons should not be placed on the ground alongside the tracks.

Before extracting the injured persons from the battle machine, those working should put antichemical protection equipment on the patients and carry out a partial deactivation of those sections of the armor plate with which the wounded persons may come into contact in the process of extracting them, or these parts should be covered with protective mantles of the crew members.

If the battle circumstances, the condition of the wounded persons and the condition of the machine permit, after rendering first aid in the machine in a contaminated locality, the injured persons should not be removed from the SAU until the arrival of litter bearers or an ambulance.

Work Awarded the Lenin Premium

Professor A. Ya. Alymov, Corresponding Member of the Academy of Medical Sciences USSR

The problem of rickettsial diseases is of very great importance in infectious-disease pathology. At the present time, a description of more than 30 types of rickettsial diseases is given in the scientific literature which are pathogenic for man and animals. Epidemic typhus occupies the principal place in the classification of the rickettsial diseases, but in the past few decades considerable attention has been given to "Q" fever cases of which are being recorded in a progressively larger number of places. The considerably increased scientific research work which is being done in the study of the rickettsial diseases confirms the importance of this problem for Soviet public health. The study of the rickettsial diseases is essential also because to date many phases of this problem remain unsolved. This is why P. F. Zdrodovskiy's and Ye. M. Golinevich's work "Study of Rickettsias and Rickettsial Diseases", which has been awarded the Lenin premium, deserves particular attention. (P. F. Zdrodovskiy and Ye. M. Golinevich "The Study of Rickettsias and Rickettsial Diseases." 2nd edition, Moscow, 1956).

The book by P. F. Zdrodovskiy and Ye. M. Golinevich is the result of considerable, many-years' work by a large group headed by one of the authors (P. F. Zdrodovskiy). The authors utilized a tremendous scientific collection of material. It is sufficient to state that the bibliographic sources alone given by the authors number about 800 titles. However, the essential part of the book is not in the analysis of the bibliographic sources utilized: from the beginning to the end the authors' own material and that of their colleagues working under their direction are systematically presented to the readers in the book. The work "The Study of Rickettsias and Rickettsial Diseases" constitutes an irreplaceable textbook and reference work both for the research worker and for the practical worker. In it matters of the great and complex problem of the rickettsial diseases are analyzed completely and at the current level of our knowledge.

Many rickettsial diseases are still inadequately known by the physicians and are diagnosed incorrectly as other nosologic entities. Such a cardinal problem as the preservation of the typhus pathogen in the interepidemic period has not been clarified to date. The recurrence theory

as certain authors write, requires further confirmation; it is doubted or rejected by many scientists and physicians.

It has been found by Soviet scientists that in addition to epidemic typhus fever there are at least seven other distinct forms of rickettsial diseases widely distributed in the Soviet Union. However, it is believed that even now not all the rickettsial diseases have been recorded and studied on the territory of the USSR. Further painstaking work is required on the study of the epidemiology, prophylaxis and treatment of this group of diseases. Physicians, primarily those of prophylactic classification, as well as physicians in other specialties should be acquainted with the clinical aspects, epidemiology and prophylaxis of the rickettsial diseases, with the accurate diagnosis of them and with the scientific research work done in this direction.

The monograph of P. F. Zdrodovskiy and Ye. M. Golinevich consists of two large divisions: a general and a special part. In the very valuable general part an analysis and synthesis have been made of a large collection of their own as well as bibliographic material. In it, chapters have been presented on the characteristics and classification of pathogenic rickettsias and rickettsial diseases, on the history and classification of rickettsias and rickettsial diseases, on the morphology and morphogenesis of rickettsial diseases in the blood-sucking arthropods (lice, fleas, ticks), on experimental rickettsial diseases in various animals, on culturing and on survival of rickettsias in the environment, on the serology and serodiagnosis of rickettsial diseases. Considerable attention has been given to experimental research necessary for accomplishing the work of describing various rickettsial diseases. "The most important methods of working with rickettsial diseases" have been noted and written in a separate chapter. This chapter is particularly valuable and essential for workers at the periphery, but it is also needed by laboratories and institutes where the rickettsial diseases are being studied.

It is impossible to discuss even briefly the characteristics of all the chapters and divisions in the book; therefore, we must analyze simply the most important divisions, chiefly from the general portion.

In the classification of the rickettsial diseases there are still many unclear, unresolved problems. The authors believe that at the present time the antigenic structure of rickettsias has not as yet been completely studied, which makes it impossible to work out a perfect classifica-

tion of the rickettsial diseases. The authors have justifiably introduced a number of corrections into the current most popular classifications of Pinkerton and Philipp. They believe that at present the most rational and complete classification should be considered the classification of V. M. Zhdanov and R. S. Korenblit (1950).

In connection with the improvement in the classification of the rickettsial diseases the author suggests a system of comprehensive classification also of rickettsial diseases, dividng them into five groups: 1) the group of louse-flea typhus (the typhus group); 2) the group of tick-borne /Rocky Mountain/ spotted fever; 3) the red tick fever group; 4) the group of pneumotropic rickettsial diseases or the "Q" fever group, and 5) the group of paroxysmal rickettsial diseases. In general, such a classification should satisfy microbiologists, epidemiologists and specialists on infectious diseases. Probably the name of the fourth group should have been made somewhat more exact by replacing the name "pneumotropic" with another name, because according to numerous investigations, particularly of Soviet authors, the cardinal sign of pulmonary involvement in "Q" fever is not so frequently encountered. The fifth group of rickettsial diseases also requires some modification with respect to paroxysmal rickettsial diseases of the Ukranian authors, to which P. F. Zdrodovskiy and Ye. M. Golinevich have directed attention.

In the chapter on the morphology and morphogenesis of rickettsias P. F. Zdrodovskiy, after a careful analysis of the data in the literature, suggests his own classification, dividing rickettsias into four morphologic types -- a, b, c, and d, emphasizing that the entire pleomorphism of rickettsias can be morphologically defined as the result of growth with a division of them or without division of them into daughter cells. P. F. Zdrodovskiy suggested an original method of staining, very simple and convenient, which at the present time has become widespread. In individual sections, the authors analyze the characteristic features of the morphology of various groups of rickettsias.

In the chapter on the rickettsial diseases of blood-sucking arthropods the authors describe rickettsial diseases in lice, fleas and ticks, which is not only of theoretical but also of practical importance (preparation of vaccine from infected lice). In this chapter brief information is also presented on the anatomy and virology of the vectors mentioned.

The chapter on "Experimental Forms of Rickettsial Diseases in Animals" deserves special attention. It is of

great practical importance for laboratory workers who are studying rickettsial diseases. The authors describe six forms of experimental rickettsial diseases in animals according to their characteristic features: 1) febrile, febrile-scrotal and asymptomatic forms, 2) pulmonary, 3) peritoneal, 4) septicemic form, 5) ocular, testicular and cutaneous form, and 6) rickettsial intoxication. In the description of these forms not only the course of the infections in animals is given but the significance of the genus of the animals, starvation, vitamin deficiencies, and the effect of radiation factors is also indicated. Definite attention is also given in the book to the culturing of rickettsias and to their survival in the environment, and the authors' own interesting material is presented.

In the chapter devoted to problems of serology and serum diagnosis of rickettsias information is given concerning the preparation of antigens, the performance of serologic reactions, the general characteristics and evaluation of these reactions. In addition to the data in the literature, considerable original material has been presented in this chapter which makes it most interesting, acquainting the reader with the authors' own experimental work (Ye. M. Golinevich).

There is no need to say much about the significance of serologic methods of investigation in either experimental work or in the diagnosis of rickettsial diseases at the patient's bedside. On the basis of tremendous personal material on the study of the agglutination reaction and the complement-fixation reaction the authors of the monograph recommend using the complement-fixation reaction in hospital and experimental work with rickettsial diseases.

In a large chapter, "The Most Important Methods of Working With Rickettsias" the authors give practical information concerning the staining of rickettsias isolated from sick people, vectors and wild animals, observations on infected animals, etc. In this chapter the essential experimental methods which are required in the study of rickettsial diseases are presented systematically.

In the second, special portion of the book information is presented on the etiology, epidemiology and prophylaxis of various rickettsial diseases. Here, all the known rickettsial diseases are presented to an extent sufficient for their analysis in the form of a rickettsial disease and sufficient to make possible the use of the principal measures of control and prophylaxis. Naturally, the greatest attention was given to epidemic typhus. A definite place was also given over to rat-borne typhus /endemic typhus/ and

"Q" fever, the area of distribution of which is becoming progressively greater. In addition to epidemic typhus, "Q" fever and endemic typhus the following have been presented in the monograph: Rocky Mountain spotted fever, Marseilles fever, tick-borne typhus of Northern Asia, rickettsialpox, Tsutsugamushi fever, tick fever, Volhynia fever, other rickettsial fevers (South African and East African tick fever, tick-borne typhus of Northern Queensland). The presentation of each rickettsial disease was made according to a standard system (definition, history, distribution and local characteristics of the disease, etiology and experimental forms of the infection, clinical aspects, diagnosis, epidemiology, measures of control and prophylaxis), which completely acquaints the reader with the given rickettsial disease. At the same time, still unsolved, debatable problems are noted and means are outlined for resolving new problems. In various rickettsial diseases mention is made of the distinguishing characteristics of each rickettsial disease, and appropriate material from the literature is presented.

In addition to the specific epidemiology and clinical aspects of the rickettsial diseases there are also several chapters of general nature in a special portion.

In reading over the chapter "Chemotherapy of the Rickettsial Diseases", the physician becomes acquainted with the current achievements in the chemotherapy and antibiotic therapy of the rickettsial diseases. He learns about the success in the use of paraaminobenzoic acid, penicillin, aureomycin, chloromycetin, terramycin, and biomycin /Soviet aureomycin/ in various rickettsial diseases. The authors did not limit themselves simply to reporting this information; they posed the problem of the influence of antibiotics on the development of immunity and on the combination of antibiotics with specific vaccination for study and resolution, which is very important from a theoretical and practical aspect. The posing of this problem and the solution of it undoubtedly are of essential importance in the prophylaxis of the rickettsial diseases.

In the monograph a chapter has been included "The Pathology and Pathomorphology of the Rickettsial Diseases" (author I. N. Kokorin)--which is extremely important for the study of the pathogenesis of the rickettsial diseases. The pathomorphology of the rickettsial diseases is presented by I. N. Kokorin chiefly in comparison with that of typhus, which has been studied most completely from a pathomorphological point of view.

Involvement of the blood vessels, which is of a systemic nature and which is found in all the organs and tissues and which has a particularly characteristic localization in

the skin (exanthem) and in the central nervous system (encephalitis) underlie the pathomorphology of the rickettsial diseases. In this chapter the conception of A. P. Avtsyn is presented; he believes that the chief factor in the pathogenesis of typhus is rickettsial intoxication--the irritation of various receptors by toxic agents elaborated by the rickettsias.

"The Relationship of Immunity in the Rickettsial Diseases and the Comparative Immunology of Them" is how the authors named the chapter in which they speak about the antitoxic, anti-infectious immunity in the typhus group, and post-infectious and inoculation immunity in typhus. Here, problems of crossed immunity are analyzed. According to the authors' data, the pathogens of Marseilles fever and Northern Asiatic tick-borne typhus are very similar in their antigenic structures, which is revealed by their antigenic kinship.

In the chapter "Vaccination Prophylaxis of Typhus" the authors discuss the characteristics and efficacy of various vaccines ("the louse" vaccine of Weigl and of Pshenichnov-Reicher, the egg vaccine of Cox, the lung vaccine of Duran and of Krontovskaya-Mayevskiy) and it is indicated that the use of killed typhus high concentration-vaccine shows promise for increasing the anti-infectious effect of the vaccinations. At the present time, there are definite prospects of obtaining a live vaccine against typhus, which has an advantage over killed vaccine.

The last chapter "Comparative Characteristics of Rickettsial Diseases" gives a brief characterization of the best studied rickettsial diseases according to groups (typhus group, Rocky Mountain spotted fever group, Tsutsugamushi group and the gamasid rickettsial disease group). In this chapter an attempt has been made to clarify the genesis and subsequent evolution of rickettsial diseases, and mention is made of the rickettsial variants of the Prowazeki type and of the Mooser type.

P. F. Zdrodovskiy and Ye. M. Golinevich's monograph, which presents knowledge of the rickettsias and rickettsial diseases, is an original work, to which there is nothing similar in either the Soviet or foreign literature. This book may also satisfy the experimenter occupied in the study of rickettsial diseases and the practising physician; they will find in it a highly scientific guide-book for their practical activity.

The high praise of the book which is expressed in the award of the Lenin premium to its authors, emphasizes its importance for medicine and places this work among the outstanding works of Soviet scientists.

Experiment of Mass Aerogenic Vaccination of Humans Against Anthrax*

N. I. Aleksandrov, Major General of the Medical Service
N. Ye. Gefen, Colonel of the Medical Service
N. S. Garin, Lieutenant Colonel of the Medical Service
K. G. Gapochko, Lieutenant Colonel of the Medical Service
V. M. Sergeyev, Lieutenant Colonel of the Medical Service
M. S. Smirnov, Lieutenant Colonel
A. L. Tamarin, Colonel of the Medical Service
E. N. Shlyakhov, Candidate of Medical Science

Certain theoretical and experimental data of our research of several years' standing on the problem of aerogenic immunization were already published in a brief form**.

Accumulated data on the studies of "reaktogennost" [reactive efficiency] and effectiveness of the cited method of immunization, obtained in experiments on animals (guinea pigs, rabbits, sheep, [illegible in original]), as well as positive results of studies of the method on people, permitted to proceed, with the permission and on the recommendation of the Committee of Vaccines and Sera of the Ministry of Public Health USSR, to a wider approbation of the method of aerogenic immunization by the dust anthrax vaccine; it was produced in March 1959.

The present work is the first experiment of mass aerogenic vaccination of people, and, therefore, its results are of decided interest. We set the following problems when conducting the work: to test and make more precise the method of mass aerogenic vaccination of people under practical conditions; to test and determine more accurately the previously obtained data about reactive efficiency of immunization against anthrax; to define the comparative effectiveness of various methods of immunization against anthrax with the aid of the specific allergen, which was developed and suggested, in 1957, by E. N. Shlyakhov under the name of "anthrax allergen MIEMG."

The aerogenic vaccination was conducted in an ordinary room (size 40 m^3) of the district hospital (area 3.7 x 3.6 m; height 2.9 m) with one window and one entrance door. Radio

* This work was conducted in the Moldavian SSR under the leadership of Under Secretary of Public Health MSSR, V. A. Malygina, with the assistance of N. N. Ezhov, M. G. Ostapenko, A. S. Goreshter and E. V. Gruz.

** See Voyenno-Meditsinskiy Zhurnal, Nos 10, 11 and 12 for 1958.

was provided in the room, and it was equipped with benches and chairs. The vaccine was diffused from two apparatuses that were installed symmetrically along the line, which divided the room lengthwise and in two; apparatuses were placed away from the walls at a distance of 1.8 m, 1.23 m and 2.46 m, and at a height over the floor equal to 2.4 m.

During each process of immunization, 40-50 people were vaccinated simultaneously in such a room. Five series (Nos 2, 13, 16, 23 and 27) of the aerogenic vaccine from strains STI-1 and No 3, with an initial activity of from 20 to 2,500 billion of spores in one gram, were utilized for the immunization.

Depending on the initial activity of the vaccine, we placed in each atomizing apparatus from two to three grams of vaccines. Consequently, in all, from four to six grams were dispersed in the room. Atomization took place continuously during the course of the entire exposure to immunization, which lasted from 5 to 15 minutes.

The sittings for immunization were conducted in a similar room, but of a size of 20 m^3. In the given dose it proved to be sufficient to use one atomizing apparatus in order to create the necessary concentration of the vaccine in the air; it was placed in the center of the room. Estimation of living microbes in the air of the room, as well as determination of the aerogenic immunizing done, obtained by each of the participants in the test, was produced by the method of test samples of air intake, through a gas mask, that was equipped with a foam-gelatin filter at the inlet. Specimens were taken during the course of the entire exposure to immunization by two men at the same time (with a certain one minute volume of lung ventilation), who were present in the room together with those being vaccinated. Thus, on the filter was retained the amount of microbes, which a man could breathe in during the time of aerogenic immunization, that is, equal to the aerogenic immunizing dose. Determination of this dose was achieved by means of dissolving the filter in physiological solution, with following tenfold dilutions and sowings on D agar. Knowing the aerogenic dose of exposure, as well as the one minute volume of lung ventilation, it was possible to calculate the mean concentration of living microbes in the air of the room by means of dividing the dose in the product of the one minute volume and the exposure.

Taking into consideration that doses of the aerogenic anthrax vaccine in the limits of 50-500 min living microbes created an immunity of sufficient intensity. [Illegible] preliminary tests were borne by people without any reactions, we decided to use the same doses in the present work.

In all, 363 persons were subjected to aerogenic vaccination; of these 220 to doses which comprised tens of millions of living microbes (from 15 to 63 min), and 143 to doses, which comprised hundreds of millions of living microbes (from 440 to 640 min). All the persons, who were to be subjected to aerogenic vaccination, underwent an examination at the dispensary, which included medical examination, clinical analyses of blood and urine, as well as X-ray examination of chest organs. Essentially healthy persons of this group, in the age group 18-45 years old, who worked at the kolkhoz, were subjected to immunization.

Medical observation of the state of health of the vaccinated was established at once from the moment of immunization and was conducted in 263 persons during the course of seven days, and in 100 during the course of 21 days. Besides the daily taking of temperature, on the first, third, fourth and sixth day of observations, certain of the immunized (100 persons) were subjected to X-ray examinations of chest organs, as well as to clinical analyses of blood (total number of leucocytes and ROE [erythrocyte sedimentation reaction]).

It was established, as a result of observations that among the vaccinated not one person had either a local or general clinically expressed reaction. No temperature reaction was observed in anybody, neither any other changes in the state of health. All the vaccinated persons continued to conduct the agricultural work on the preparation for the spring sowing campaign. X-ray examinations of chest organs of vaccinated persons, conducted in one, three and six days after immunization, also did not show any changes. One should point out that in 19 persons, who underwent aerogenic vaccination, some changes in the lungs were observed during dispensary examination; they indicated that these persons underwent a tuberculosis process in the past (petrifications, sinus adhesions, pleural superpositions ["nalozhenita"], interlobular twists ["shvarty"] and others). Further observations did not show any aggravations of the existing changes or deterioration of health conditions in a single person.

A temporary change in the total amount of leukocytes of the blood and "ROE" [erythrocyte sedimentation reaction] were the only clinical symptoms of the response reaction of the organism to the inhaled vaccine.

The results of hematologic changes in persons who were immunized with the aerogenic anthrax vaccine, as compared with similar indicators before the vaccination, are cited in Table 1.

Table 1

Time of examination after vaccination	Number of the examined	Number of leukocytes after immunization						"ROE" after immunization			
		Decrease[1]	Without change	Increase by: 500-1,000 leukocytes	1,100-3,000 leukocytes	3,100-5,000 leukocytes	No of persons with an amount of leukocytes that exceed the norm[2]	Retardation	Without change	Acceleration	Acceleration exceeding norm[3]
1 24-hour day	28	4	2	10	5	7	8	2	9	17	6
3 24-hour day	28	5	2	7	8	6	7	5	13	10	4
6 24-hour day	19	5	4	6	4	-	2	3	8	8	1
In all for all dates	75	14	8	23	17	13	17	10	30	35	11

Footnotes: 1. Decrease in the number of leukocytes, in comparison with the given indicators before vaccination, were not below the norm in a single case (5,000 leukocytes in 1 mm^3 of blood).
2. The upper limit of the norm was assumed as 9,000 leukocytes in 1 mm^3 of blood.
3. The upper limit of the norm for men was assumed as 10 mm/hour, for women as 15 mm/hour.

It is seen from the cited data, that already in 24 hours after vaccination an increase in the amount of leukocytes was noted in most of the examined (22 out of 26). Increase of leukocytes, basically, was within the limits of the norm. Nevertheless, in eight cases it comprised 9,300 - 10,200 leukocytes in 1 mm^3 of blood. Along with this in 17 persons out of 28 was noted an accelerated "ROE" [erythrocyte sedimentation reaction]; whereupon in six -- with an insignificant exceeding of the norm (from 15 to 20 mm/hour. Similar changes took place also in three days after vaccination; there was one difference only, that the number of persons with the acceleration of "ROE" was reduced.

On the sixth day after vaccination, only half of all the examined showed an insignificant increase in the number of leukocytes; whereupon, only in two cases it exceeded the norm. At this time of examination, erythrocyte sedimentation reaction also, as a rule, became normal. Thus, the cited data ascertain that the aerogenic anthrax vaccine, which was used

in reasonable doses, proved to be virtually "areaktogennol" [areactogenic -- producing no reaction?]. Nevertheless, distinct changes on the part of the blood, which were discovered after the immunization, indicate the presence of a general reaction of the organism to the vaccine that proceeded in a subclinical form, and which can be discovered only through laboratory methods of research.

Immunologic effectiveness of the aerogenic anthrax vaccine was studied with the aid of the specific allergen of the Moldavian "IEMG" [Institute of Epidemiology, Microbiology and Hygiene?] (series 22 and 24). The allergen was diluted with physiological solution in a ratio 1:1 before its use and was injected intracutaneously into the forearm of the left arm in the amount of 0.05 ml. For the control of the specific reaction, physiological solution was introduced into the forearm of the right arm in the same amount. The reaction was evaluated in 24 and 48 hours according to a time scale which was developed by E. N. Shlyakhov. Simultaneously with the conducted aercgenic vaccination, we studied, in the same way, the immunologic effectiveness of the vaccine STI in its subcutaneous and cutaneous applications. Vaccination was conducted in precise conformity to the existing instructions for the application of this vaccine. In all 250 persons were vaccinated subcutaneously and 250 -- cutaneously. Comparative indicators of immunological effectiveness of the anthrax vaccine in its aerogenic, subcutaneous and cutaneous application are presented in Table 2.

It is seen, from the cited data (in Table 2), that the positive allergic reaction was registered in aerogenically vaccinated people, as well as in those immunized subcutaneously and cutaneously, already on the seventh day. In the group of persons, aerogenically vaccinated, the number of positive reactions, at this time of examination, was smaller than in the group of people who were vaccinated subcutaneously. We found an explanation for this fact in the matter that among the number of aerogenically vaccinated and examined on this date were only the persons who were immunized with a dose which comprised tens of millions of microbe bodies (42-63 min), and did not prove to be the best.

Somewhat different proportions were obtained on the following dates of examination of those vaccinated by different methods, where in the groups of aerogenically vaccinated, together with persons who were immunized with a dose of tens of millions of microbe bodies, there was a considerable number of those who were vaccinated with a dose of hundreds of millions of microbe bodies (440-660 min).

Table 2

Time of examination after vaccination	Method of vaccination	Number of the examined	Number of persons with: Reactive allergic reaction	Ineffective reaction	Doubtful allergic reaction	Number of persons with a positive allergic reaction: In all	+	++	+++	++++
7th day	Aerogenic	19	7	1	2	9	9	-	-	-
	Subcutaneous	25	4	1	3	17	5	5	7	-
	Cutaneous	25	10	-	4	11	3	6	2	-
15th day	Aerogenic	26	4	-	3	19	4	7	6	2
	Subcutaneous	49	18	-	8	23	11	7	5	-
	Cutaneous	50	20	2	6	22	5	10	7	-
30th day	Aerogenic	64	21	1	11	31	14	9	8	-
	Subcutaneous	50	14	4	14	18	8	-	10	-
	Cutaneous	50	22	2	14	12	6	2	4	-
90th day	Aerogenic	52	8	1	8	35	18	9	7	1
	Subcutaneous	52	15	2	8	29	12	4	11	-
	Cutaneous	24	7	2	6	9	8	1	-	-
	Control (unvaccinated)	70	50	9	7	4	4	-	-	-

Footnote: To the ineffective were referred the reactions where hyperemia was present after the application of both the allergen and the physiological solution.

About 3/4 of the vaccinated, who were aerogenically vaccinated, reacted positively to the allergen in 15 to 90 days after vaccination. In groups of those vaccinated subcutaneously and, especially, cutaneously the number of positively reacting was smaller. Positive allergic reaction occurred in 30 days in half of all the examined in the group of aerogenically vaccinated, while in those inoculated subcutaneously and cutaneously -- approximately in 1/3.

In connection with the fact that the size of the inhaled dose of the vaccine essentially influenced the indicators

of immunological effectiveness, and the maximum doses tested by us (440-660 min. microbe bodies) were especially favorably endured by the people, the allergic reactions in persons who were immunized with these doses, are of special interest.

Results of the allergic reaction in the aerogenically vaccinated persons, depending on the immunizing dose, are shown in Table 3.

Table 3

Time of examination after vaccination	Dose of aerogenic vaccine	Number of the examined	Number of persons with			Number of persons with a positive allergic reaction				
			Negative allergic reaction	Ineffective reaction	Doubtful allergic reaction	In all	+	++	+++	++++
7th day	43-63 min. microbe bodies	19	7	1	2	9	9	-	-	-
15th day	43-63 min. microbe bodies	17	3	-	2	12	2	4	3	2
15th day	440-660 min. microbe bodies	9	1	-	1	7	1	3	3	-
30th day	43-63 min. microbe bodies	20	9	1	3	7	2	3	2	-
30th day	440-660 min. microbe bodies	44	12	-	8	24	12	6	6	-
90th day	43-63 min.	26	4	-	5	17	7	4	6	-
	440-660 min.	26	3	1	4	18	10	5	2	1

It is seen from the table that persons, immunized with a dose comprising hundreds of millions of microbe bodies, had negative allergic reactions somewhat rarer in comparison with those who received tens of millions of microbe bodies. These data are entirely in keeping with the results of tests of effectiveness of the aerogenic anthrax vaccine in crucial experiments with sheep. Animals, vaccinated with a dose of 500-700 min. microbe bodies, as a rule, acquired an immunity of high intensity to the infection of the virulent culture B. anthracis in doses 10-10,000 MLD.

Thus, the dry aerogenic vaccine against anthrax from

strains STI-1 and No 3, while being "areaktogennoi" [producing no reaction], provided an immunological reorganization in the organism of vaccinated persons; these displacements were registered in the dynamics by means of an intracutaneous test with the anthrax allergen.

It was again convincingly shown, on the basis of the conducted work, that it is possible, if necessity arises, to immunize quickly a large number of people with the aid of the aerogenic method of vaccination. Thus, in a 40 m^3 size room, during the course of one hour, we succeeded in vaccinating up to 300 persons with an exposure of five minutes. Whereupon, besides the physician only two workers from among the secondary medical personnel took part in this work. Consequently, having three small rooms, size of 40-50 m^3, or tents of a corresponding size, a brigade of five-six men can vaccinate up to 1,000 persons and more during the course of one hour.

The cited data show that the aerogenic vaccination permitted to vaccinate a comparatively large number of people in a short time; this is especially important in urgent anti-epidemic measures. All this permits to consider the aerogenic vaccination as a rapid method of immunization of people and of agricultural animals, according to epidemiological and epizootiological indications.

Conclusions

1. Dry aerogenic vaccine against anthrax, produced from strains STI-1 and No 3, is virtually areactogenic [producing no reaction] in reasonable doses.

2. Aerogenic immunization with antianthrax vaccine provides an expressed immunological reorganization in the organism of vaccinated persons, which is registered in the dynamics with the aid of the anthrax allergen MIEMG.

3. Aerogenic vaccination can be utilized as a rapid method of immunization according to epidemiological indications.

Combined Method of Protection of Man Against Blood-Sucking Insects

O. F. Smirnov, Colonel of the Medical Service, Candidate of Medical Sciences
A. P. Bocharov, Captain of the Medical Service

The elimination of the vectors of infectious diseases in a locality can not always be accomplished in time, particularly under conditions of life on the march. In connection with this, the role of individual protection of man against the attack of blood-sucking insects is increased. For this purpose repellents or insecticides may be used, whereby the expediency of using various preparations is determined by the characteristics of their effect on various types of insects and the duration of a person's being in an unfavorable locality.

Problems of prophylaxis against parasites in certain cases can not be considered completely solved. For example, this is how the matter stands with the protection of man against the attack of fleas -- the vectors of plague and rat-borne typhus. The great sensitivity of these insects to organic chloride insecticides is well known. In 1956, O. V. Smirnov, N. D. Pravdin, M. V. Kuris and K. P. Chagin utilized a DDT preparation as a means of individual protection against the attack of fleas of the Xenopsylla cheopis species under field conditions. The tests showed that people dressed in summer suits treated with 10-percent dust or two-percent DDT emulsion are usually protected against the attack and subsequent bites of insects. However, in certain experiments solitary insects penetrated under the clothes and maintained their ability to bite. The incomplete protection effect can be explained by the fact that part of the fleas manage to penetrate under the clothes before they develop paralysis. In addition, insects attach themselves to unprotected parts of the body (neck, hands, back of the head).

In 1957, we made laboratory tests during which the participants of the experiments dressed in suits treated with DDT preparation, and, in addition, applied repellent to exposed parts of the body.

Dimethylphthalate, which possesses good repellent properties with respect to mosquitoes, gnats and certain other insects, does not protect man completely against the attack of fleas. This has been established by laboratory and field experiments conducted in 1956. The same thing may be said also about dibutylphthalate.

The preparations RP-1, RP-17, RP-50 possess stronger

repellent effects with respect to fleas. Of these repellents we were able to obtain only RP-1, with which we carried out our experiments for protecting man against the attack of X. cheopis fleas. The RP-1 preparation (the dimethyl ether of tetrahydrophthalic acid) possesses a definite but brief repellent effect with respect to fleas of this species.

People who participated in the tests wore cotton pullover tunics and trousers over their underwear, boots; they wore a service cap on the head. The day before the tests the underwear and clothes were treated with two-percent of a water-turpentine emulsion or 10-percent DDT dust (computing one gram of active substance per square meter). For the purpose of protecting the exposed parts of the body, RP-1 was used (2-2,5 cubic centimeters of the preparation per person); it was applied directly before the beginning of the experiment. The footwear was not treated.

Three persons participated in every experiment; of these, one was dressed in ordinary clothes, and two others were dressed in clothes and underwear which had been impregnated with DDT preparation, whereby one of them smeared his neck, face and hands with repellent. All three participants in the experiments entered the laboratory room (area of the floor was 13 square meters), into which fleas had been admitted before the experiments were begun according to a calculation of 200 specimens per square meter. The participants of the experiments sat on the floor of the room for two hours. Then, they went into another room where the fleas were removed from them and where the total number of fleas were determined, as was the number of fleas which had sucked (in the latter category were the fleas which had unchanged blood in the intestinal tract). The results of the experiments with the use of clothes and underwear impregnated with two-percent water-turpentine DDT emulsion are presented in Table 1.

In treating the clothes and underwear with 10-percent DDT dust similar results were obtained, that is, complete protection was observed only in those cases where a person dressed in a suit had been treated with insecticide, and had smeared his neck, face and hands with RP-1 preparation.

The experiments showed that treatment of the hands with RP-1 repellent just to the wrist joint (not to the elbow as we had done in experiments described above) did not prevent the penetration of the fleas to untreated parts of the body. Therefore, not only the exposed parts of the body should be smeared with repellents but also the surface of the skin covered by the sleeves and by the collar.

Table 1

Means of protection	No of experiments	Number of fleas collected in all experiments: From the outside surface of the clothes	From the inner surface of the clothes and the outer surface of the underwear	From the inner surface of the underwear and from the body	Exposed parts of the body
Clothes and underwear impregnated with DDT emulsion; RP-1 preparation applied to exposed parts of body	6	167/0	3/0	0	0
Clothes and underwear impregnated with DDT emulsion	6	233/1	6/0	0	5/4
Insecticides and repellents not used (control)	6	620/11	161/10	35/7	6/1

Note. The numerator indicates the total number; the denominator, the number of fleas which have sucked.

We attempted to simplify this method by impregnating only the underwear with the DDT preparation. The lower underwear and socks were treated with two-percent water-turpentine DDT emulsion. The results of these experiments are presented in Table 2.

From the Table it is seen that insecticide impregnation of underwear alone does not protect a person completely from the attack or bites of fleas even if the exposed parts of the body are treated with RP-1.

Evidently, the fleas manage to get on the body and to suck before the advent of paralysis in them.

Table 2

Means of protection	No of experiments	Number of fleas collected in all experiments: From the outside surface of the clothes	From the inner surface of the clothes and the outer surface of the underwear	From the inner surface of the underwear and from the body	Exposed parts of the body
Underwear impregnated with DDT emulsion; RP-1 preparation applied to the exposed portions of the body	3	203/2	7/1	4/2	0
Underwear impregnated with DDT emulsion	3	436/4	33/1	8/2	8/6
Insecticides and repellents not used (control)	3	768/8	350/14	49/19	15/10

Note. The numerator indicates the total number; the denominator, the number of fleas which have sucked.

Through preceding experiments it has been established that the time of action of RP-1 applied to tissues is limited to a few days after the treatment. When the preparation is applied to the skin it loses its repellent properties even more rapidly. In order to clarify the duration of the protective effect of various repellents we performed a series of experiments according to a method which we had developed. Two glass jars with a volume of 10 liters each were placed on special supports in a tilted position which excluded the exit of fleas. One hundred X. cheopis fleas were dropped into each jar. A human hand which had been treated to the elbow joint with a preparation being tested (20 drops for one hand) was inserted into one jar; an untreated hand was inserted into the other. After 15 minutes the fleas remaining on the hands were shaken off, after which the hands were taken out of the jars. Then the number of individuals which had sucked were determined, which were also the main criterion for evaluating the repellent effect of the preparation. In these experiments we made use of

dimethylphthalate, dibutylphthalate, RP-1 preparation and RP-2 preparation (dimethyl ether of methyltetrahydrophthalic acid) and RP-99 (acetyltetrahydroquinolin). We obtained the RP-2 and RP-99 during the time that we were doing the work. The results of the experiments are summarized in Table 3.

Table 3

Name of preparation	No of observations	No of fleas which had sucked collected depending on the time of treatment of the hands with the repellent (in hours before beginning the experiment)						
		Immediately	1	2	3	4	5	6
Dimethylphthalate	3	2	1	2	2	3		
Dibutylphthalate	3	8	5	8	12	8		
RP-1	3	0	0	0	12	34		
RP-2	3	0	0	0	0	5		
RP-99	3	0	0	0	0	0	9	8
Control	Average for 3 experiments	56	75	55	60	72	72	69

From these data it is seen that dimethyl- and dibutylphthalates do not completely protect against the attacks of fleas on the hands even immediately after applying the preparation; partial protection is, nevertheless, achieved particularly with the use of dimethyphthalate. RP-1, RP-2, RP-99 completely protect against the attacks of fleas for two to four hours after applying the preparations. The RP-1 preparation possesses the shortest effect; RP-99 possesses the longest effect, but it does not exceed four hours.

We made an attempt to prolong the effect of RP-1 by diluting this preparation in various substances. A 10-percent solution of RP-1 in dimethylphthalate lengthened the duration of its effect to four hours.

Conclusions

1. A person can be protected against X. cheopis fleas only through the combined method of protection which combines the use of clothes and underwear treated with DDT preparation with the simultaneous application of repellent on the exposed parts of the body.

2. For the purpose of protecting the exposed parts of

the body against fleas, use may be made of preparations of RP-1, RP-2 and RP-99. Taking into consideration the brevity of effect of these preparations the exposed portions of the body have to be treated repeatedly with repellents in an unfavorable locality for a long time. For prolonging the time of action of RP-1 use should be made of 10-percent dilution of it in dimethylphthalate.

Effective Measures of Protection Against Ticks

S. G. Gladkikh, K. D. Shvetsova-Shilovskaya

The prophylaxis of tick-borne encephalitis is a complex and difficult matter. Under certain conditions (geological operations, tourist trips, etc.) the complete extermination of ticks in nature is impossible. The use of substances which repel ticks, along with mechanical measures of protection, is attractive by virtue of its simplicity and effectiveness. With the aim of repelling Ixodes persulcatus R. sch. ticks we (S. G. Gladkikh) in conjunction with other authors in 1953-1955 made a study of the effect of diethyldimethyl- and dibutylphthalates. (see "VMZh" No 4, 1955).

In 1955-1956 we checked the effect of new preparations synthesized at the NIUIF [Scientific Research Institute of Fertilizers and Insectifungicides] of the Ministry of the Chemical Industry. Among them were the dibutyl ether of adipic acid, arbitrarily called OK-1, N-butylacetanilide (OK-2), as well as the repellent mixture OK-3, which contains the dibutyl ether of adipic acid, isoamylmandelate and N-butylacetanilide; mixture OK-4 contained, in equal quantities, the dibutyl ether of adipic acid, benzylbenzoate and N-butylacetanilide. The dibutyl ether of adipic acid was proposed as a repellent by K. D. Shvetsova-Shilovskaya. At the present time, the preparation is being made in the Soviet Union in adequate quantity from the production wastes of synthetic fibers and butyl alcohol; it consists of a fluid of pale yellow color with a faint pleasant odor which dissolves in the majority of organic solvents; its boiling point is 183 degrees; its specific gravity is 0.965.

Simultaneously with these preparations a study was made of dimethylphthalate and dibutylphthalate. In 1956-1958 for this purpose we studied (S. G. Gladkikh) the repellents synthesized by A. N. Kostom, L. G. Yudin and Ye. V. Vinogradova: 1-acetyl-1, 2, 3, 4-tetrahydroquinoline (RP-99), formyltetrahydroquinoline (RP-122) and 1-butyryl-1, 2, 3, 4-tetrahydroquinoline (RP-105). Certain of them, according to foreign data, are active repellents with respect to mosquitoes and ticks. Their repellent properties are not changed by the presence of the methyl group in the two position of the tetrahydroquinoline nucleus. A study was also made of the dimethyl ether of tetrahydrophthalic acid (RP-1), the dimethyl ether of 3, 6-endomethylene-4-tetrahydrophthalic acid (American dimethylcarbate -- RP-50) a mixture of the type of 1-acyl-1, 2, 3, 4-tetrahydroquinolines made of the commercial quinoline fraction (RP-143) and terpineol. Simultaneously with these preparations the ethers of phthalic acid

were tested: dimethylphthalate, diethylphthalate, dibutylphthalate and dibutyladipinate (OK-1) which we had studied before this. Before testing in nature the preparations were checked in the laboratory on Ixodes persulcatus nymphs. Laboratory tests of the repellents were also made on sexually mature ticks.

Two concentric circles were made on a sheet of white filter paper: the diameter of the outer circle was 14.4 centimeters; that of the inner circle was 6.5 centimeters. One or two cubic centimeters of the preparations being tested were applied in an even layer with a pipette or brush (Fig. 1) to the ring area formed with a width of eight centimeters and an area of 527 square centimeters. On each sheet the date of the treatment, the preparation and the dose were noted. A sheet of paper with the same figures but not treated with the preparation served as a control.

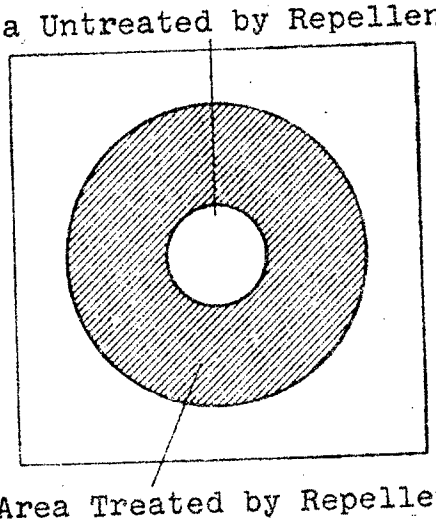


Fig. 1. Diagram of a Sheet of Filter Paper for the Purpose of Studying the Repellent Effect of Preparations.

After treatment the sheets of paper were hung up in a room to dry. For the purpose of investigating the repellent five unfed sexually mature ticks or nymphs were put into the center of the untreated circle, and observation was made of them. Ticks placed in the center of the control sheet crawled to the sides. Those ticks which crawled out of the area noted were returned to the center of the circle with an elastic forceps: in this way, a count was made of the number of times the ticks crawled out of the area indicated in a five-minute period. On the experimental sheets, if the area indicated had been treated with an effective

repellent the ticks either did not crawl through this area or they crawled through it much less than those on the control sheet. Each experiment was repeated three times. Then, a count was made of the average number of times the ticks crawled off the experimental sheets in a 15-minute period, and this was compared with the number of times they crawled off the control sheet. In the same period of time. On Fig. 2 the results are presented on a study of the repellent effect of the dibutyl ether of adipic acid on the tick nymphs. On the basis of laboratory tests the index of the repellent effect was computed for each preparation according to a well known formula

$$\frac{(A-B) \cdot 100}{A},$$

where A is the number of times the ticks crawled off in the control; B -- the number of times they crawled off in the experiment. The index of the repellent effect of certain preparations with respect to ixodial ticks is shown in Table 1.

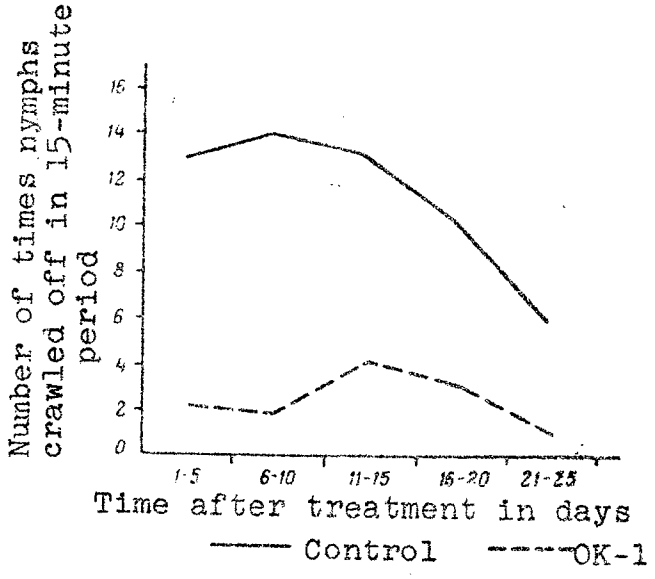


Fig. 2. Repellent Effect of Preparation OK-1 on Nymphs of Ixodial Ticks (Laboratory Experiments).

From Table 1 it is seen that the best repellent properties are shown by cusol (RP-99), dibutyladipinate and diethylphthalate. The tests of the repellent substances in nature were performed in May-July in different years and different rayons of Permskaya Oblast'. The only vector of

tick-borne encephalitis in Permskaya Oblast' is the forest tick Ixodes persulcatus. The greatest number of them are usually observed near forest settlements. The census of ticks in 1955 amounted to 60 per man-hour; in 1956, 40 per man-hour. The preparations were applied by hand in an even layer to cotton overalls in an undiluted form or in the form of the mixtures listed above with subsequent rubbing of them into the fabric or by means of a sprayer. Two hundred cubic centimeters of the preparation were used on each set of overalls. Those parts of the overalls were particularly carefully treated where the ticks might catch on most frequently, and most rapidly penetrate into the body: the ends of the trousers, the collar, and the cuffs of the sleeves. (We made a study of preparations harmless to man; however, one should be careful about keeping them out of the eyes). The tests of the repellents were accomplished on a specially selected group of volunteers. The participants of the tests who had been vaccinated previously and who had received the necessary instruction put on cotton overalls treated with the preparation (L. V. Ivanova, N. N. Tkachenko, N. N. Zhukova, R. V. Shitova and M. P. Vorsina participated in this section of the work). During the morning hours a brigade of 7 to 10 persons was sent out into the woods wearing overalls and made daily observations for five to six hours. The members of the brigade went slowly into the woods along a definite route at a rate of 1.5 to 2 kilometers an hour; one or two of them were in untreated overalls (control). Ticks which caught onto the clothes were removed and thrown behind them in order not to reduce their census for the purpose of subsequent observations.

Table 1

Preparation	Index of Repellent Effect	Preparation	Index of Repellent Effect
RP-99 (Cussol)	90	Dimethylphthalate	70
RP-122	83	Dibutylphthalate	72
RP-105	78	Diethyiphthalate	85
RP-1	56	Dibutyladipinate	85
RP-143	61	Terpineol	56
RP-50	71	Repudin	72

The overalls which had been treated with repellent and the control overalls were tested by different people on

different days. After the brigades returned from the woods the overalls were taken off and kept separately in a rolled up form or were hung in a room on nails (workers' barracks).

In Fig. 3 it is seen that the protective properties were manifested throughout the entire period of observation (35-40 days). They were shown particularly graphically during the period of the greatest tick census in nature. The repellent properties were expressed least by terpineol; most, by dibutyladipinate.

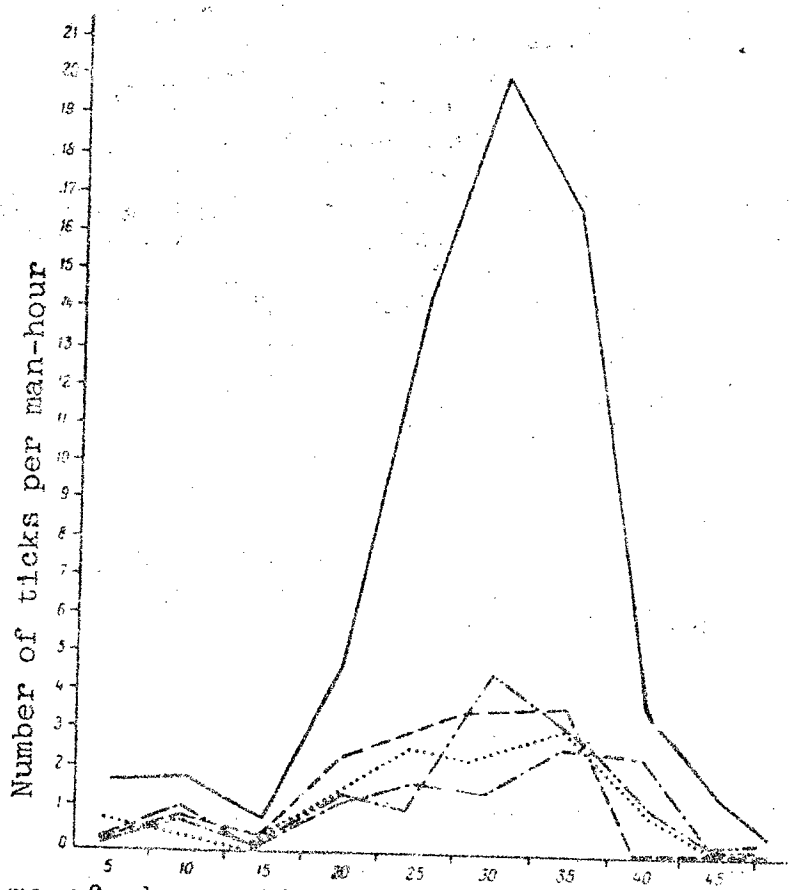


Fig. 3. Repellent Effect of Various Preparations on Ixodial Ticks.

Table 2 graphically illustrates the efficacy of the dibutyl ether of adipic acid with which the overalls were treated for the purpose of protecting against ticks.

Table 2

Day after treatment	Number of ticks removed from the overalls in an hour		Day after treatment	Number of ticks removed from the overalls in an hour	
	Treated	Control		Treated	Control
1	0	34	8	2	19
2	0	13	9	3	20
3	0	17	10	2	13
4	2	26	11	1	14
5	2	19	12	1	11
6	0	14	13	0	12

Therefore, the tests under field and laboratory conditions showed that the dibutyl ether of adipic acid is an effective measure for protection against Ixodes persulcatus ticks both in the pure form and in the mixtures indicated above. The repellent effect of the preparation is more intense and longer lasting than that of dimethyl- and dibutylphthalate.

Preparations RP-99 and RP-122 were also quite effective and long-acting repellents. Along with their repellent properties they possess the most striking acaricidal effect. On overalls treated with these preparations ticks can remain no more than 20-35 minutes. During the first 10-15 minutes they usually crawl up actively, and then they begin to crawl to the sides and downward and soon become immobile; after 5 to 15 minutes they fall off. Afterwards, 60-70 percent of such ticks die. Therefore, these preparations are of great epidemiologic importance, not only protecting man against ticks crawling on his clothes but also destroying them.

The acaricidal properties of preparations RP-99 and RP-122 were also checked by laboratory tests. Ticks placed on sheets of filter paper treated with these preparations crawled around no more than 20-25 minutes, and then became motionless. After transfer to Petri dishes 70-80 percent of them died. These preparations, according to our 1958 observations and according to the data of other authors (V. M. Saf'yanova and others, 1958), proved to be effective re-

pellents with respect to forest mosquitoes of the genus Aedes and wood lice. Mosquitoes did not settle at all on overalls treated with RP-99 and RP-122 preparations and practically did not settle on skin treated with them (two or three grams of the preparation on the face and hands). In the former case, the protection lasted one or two weeks; in the latter case, several hours.

In 1955-1958, in foci of tick-borne encephalitis the work clothes of more than a 1000 workers in lumbering establishments, of tourists and of geologists were treated with dibutyladipinate (540 persons), repudin (Czechoslovakian dimethylphthalate) and with Soviet dimethylphthalate. Students made the observations in the woods on the repellents used and on control groups. The study showed that ticks usually did not attack workers who used repellents. Persons who worked in unprotected suits often removed ticks from their clothes; in various cases they noted them adherent to their bodies. From 5 to 30 ticks an hour were found on the clothes of students who were observing the workers.

There were no cases of tick-borne encephalitis among those who used the repellents; there were solitary cases among those who did not use the repellents.

Therefore, the preparations RP-99, RP-122 and dibutyladipinate showed the most striking repellent properties with respect to the Ixodes persulcatus ticks; terpineol, the least. Preparations RP-99 and RP-122 together with repellents possess strong acaricidal properties. These two preparations as well as dibutyladipinate are simultaneously repellents with respect to ticks, forest mosquitoes and wood lice.

Prophylaxis of Cutaneous Leishmaniasis in a Natural Focus

V. A. Lugina, Lieutenant Colonel of the Medical Service

The existence of a natural focus of cutaneous leishmaniasis at the Murgab Oasis in Turkmenia has been known since 1888, at which time L. Hendenreich's monograph was published with a description of diseases among the troops who had come into the village of Pende (now Takhta-Bazar) in 1885. During a single summer-autumn season 85 percent of the personnel in this military detachment became sick. After the large scale attack of disease among the troups the name "Pende Ulcer" began to take hold for this disease.

At the present time, owing to numerous investigations in the field of epidemiology, therapy and prophylaxis cutaneous leishmaniasis has become a quite well studied disease. However, among the local population in the natural focus of the disease causes of Borovskiy's cutaneous leishmaniasis still occur. It has been established through epidemiologic analysis that the activity of the natural focus of the disease remains high and that the occurrence of cases is produced by inadequate propnylactic measures.

In 1955, we made an attempt to influence actively this natural focus of cutaneous leishmaniasis. With this aim in view, a system of prophylactic measures was organized at point K. along with the study of the natural focus, which provided for the protection of the population against the disease. (See "VMZh" No 6, 1956). In connection with the annual morbidity rate at point T. we set before ourselves the aim of studying the natural focal relationships in points T and B during the 1957 season. For this purpose, an observation from April through September of the phenology of gnats and a laboratory-parasitological examination of them were made. As a result of the study of more than 1,000 gnats it was found that their fauna consists of six species, and the relationship between the species is similar to the data obtained at point K. in 1955. The species composition of the gnats and their percentile interrelationship at point K. and T. are shown in the Table.

Species of gnats	Point K. 1955	Point T. 1957
Ph. minutus var. arpaklensis	69.6	53.2
Ph. papatasii	27.5	40.8
Ph. major	1.2	2.9
Ph. perfilievi	0.7	-
Ph. sengenti var. alexandri	0.4	1.3
Ph. chinensis	0.3	1.2
Ph. caucasicus	0.3	0.6

The census of the gnats in nature and in the day's rest in the quarters doubled during the season. The first rise occur at the end of May and the first 10 days in June, which corresponded to a mass flying-out of gnats of the first generation. The second increase was observed in the middle of August until the first 10 days in September, which corresponded to the flying-out of the second generation of gnats. In addition, in the last ten days in July a certain increase was noted in the census of gnats in the day's rest, which had been markedly reduced at the beginning of August as a result of the large-scale insecticidal measures in the quarters with DDT. Taking this into consideration, it may be considered that the beginning of the flight of second generation gnats occurs at the end of July. The first occurrence of gnats in nature and in the quarters was noted only in the middle of May. Finding of gnats in nature and in the day's rest in the quarters lasted until the advent of cold weather -- until the end of September.

As a result of the parasitological investigation of gnats it was established that there were no female gnats infected with leptomonads before the 23rd of June. The finding of infected females in nature coincides with the period in which the flight of second generation gnats is falling off. In July, when the minimum census of gnats was observed, there were no infected females found. In August and September they amounted to 20 percent of the number of females investigated. The large-scale finding of females infected with leptemonads at this period coincides with the mass flight of second generation gnats and the greatest morbidity rate of people with respect to cutaneous leishmaniasis.

The data presented concerning the finding of female gnats infected with leptomonads throughout the season and their activity in nature to a certain degree explained the cause of lack of uniformity of distribution of the cases of cutaneous leishmaniasis among people during the spring-summer and autumn months. Numerous observations from epidemiologic practice show that the main mass of cases of cutaneous leishmaniasis is recorded in August and September. The data of the morbidity rate for 1957 observed in a single population group also attest to this. In this group only two percent of the entire annual morbidity rate occurred in May; three percent in July; 59.5 percent in August; 26.5 percent in September; and nine percent in October.

By means of data obtained as a result of the study of the phenology and parasitology of the gnats it is not possible to explain the occurrence of less than two percent of the annual cutaneous leishmaniasis morbidity rate in May.

Evidently, these cases of infection occurred in particularly active microfoci, where solitary female gnats which appear in the early spring had the opportunity of becoming infected and of infecting people. However, the principal epidemiologic role during this period was played by spontaneously infected wild animals (sand rats, susliks, and hedgehogs) rather than by gnats in the natural focus. As in 1955 at point K., the aim of the present work, along with the study of the natural focalization, was the organization of an efficient system of prophylactic measures at points T and B. The fundamental sanitization of the locality by means of a marked reduction in the density of field rodents was made the basis of prophylaxis of the disease.

The existence of the habitats of the large sand rat, the red-tailed marmot, the thin-toed suslik and the eared hedgehob was established in the vicinity of point T. The total rodent census amounted to 12 per hectare. In the immediate vicinity of the location of the population and within a radius of more than 1.5 kilometers at point B. of the villages no susliks or marmots were found. This was brought about by the fact that the area was bounded by the swamped bed of a river and a plowed cotton field. Evidently, the main reservoir of the pathogen of the disease is constituted by the hedgehogs encountered here in large numbers. Spontaneous infection with the pathogen of cutaneous leishmaniasis was established in one of the hedgehogs caught.

The elimination of field rodents was carried out in the spring with chlorpricrin with baiting of the holes over an area of more than 2,000 hectares. As a result of this, the total census of rodents decreased to three per hectare, and it was possible to a considerable degree, to prevent the flying out of gnats from the larvae and pupae perviously existent in the rodent holes. On account of the laboriousness of hand treatment of the holes and the great requirement for DDT or hexachlorine preparations for insect elimination of the locality, this work was not carried out in point T, but at point B a double treatment (in May and the beginning of August) of the surface of the soil in the form of a protective belt around living quarters was carried out for a distance of 250 meters from them. In both points all the living quarters were treated with DDT by the usual method in the spring. Throughout the summer season the insect elimination in the quarters was repeated with the occurrence of gnats in a census of more than 0.2 per strip of fly paper where one strip of fly paper was used for every five square meters of quarters.

As a result of careful observation of the census of gnats in the quarters and a regular insect elimination the

maximum gnat census in the day's halts did not exceed 0.5 per strip of fly paper on the average. Because of the low census of gnats at the day's rest in the quarters at point T, measures for individual protection against gnats (dimethylphthalate screens) were not used, and the windows were not screened.

At point B use was made of dimethylphthalate (DMF cream), protective screens, and gauze netting was used for individual protection of the population against gnats; this eliminated the possibility of gnat attack during sleep. Sanitary education work was carried out among the population, and this contributed to the cognitive performance of individual and collective measures of prophylaxis. The morbidity rate with cutaneous leishmaniasis at point T. was expressed as solitary cases; at point B. a total of only one person became sick.

The experience obtained in the cause of carrying out this work makes it possible to draw the conclusion that as a result of properly organized and carefully performed systems of prophylactic measures the number of cases of cutaneous leishmaniasis in 1957 was low at points T. and B.

Method of Dusting From the Air in Controlling Ticks

M. D. Krasnov, Colonel of the Medical Service,
N. Z. Yakobson, Lieutenant Colonel of the Medical Service,
Ye. F. Vasilenko, Lieutenant Colonel of the Medical Service,
L. A. Gulimova, A. S. Opanasenko

The treatment of large areas with toxic chemical with the aim of freeing a locality from ticks -- the vectors of infectious diseases -- had been attracting considerable attention of a large circle of medical workers in recent years. The use of airplanes for these purposes is acquiring great popularity. The works of V. A. Nabokov and his coworkers and of a number of other authors indicate the expediency of using airplanes for controlling ticks in a locality. The advantages of this method are obvious. It makes it possible to treat large areas and difficultly accessible places in short periods of time; it makes it possible to distribute toxic chemicals uniformly over a locality; and to dosage accurately the insecticides per unit area.

In 1957-1958 in the study of a newly reclaimed section of a locality used for the purpose of a base where the people were permanently quartered, it was established that on the territory of the section (base) and around it a large number of ixodial ticks was encountered in the spring-summer time in a radius of up to three to five kilometers, and in the neighboring areas the local population suffered from tick-borne typhus fever; spontaneous infection of the tick vectors with the pathogens of this infection, rickettsia sibiricus, was demonstrated. This served as the grounds for taking sanitary measures for the locality, particularly by means of exterminating the ticks in nature. Taking into consideration the advantages of aircraft treatment indicated above, we used dusting of the locality from the air with 10 percent DDT dust, utilizing an AN-2 airplane for this purpose.

The section which needed to be treated was located in the East of Barabinskaya Lesostep' [wooden-steepe], which is part of the western Siberian plain and is distinguished by a uniform flatness. The locality is poorly drained. The soil water is located near the surface. The first water-bearing layer is one to 1.5 meters from the surface of the soil. The topography of the area is one with ridges and ravines with gentle slopes and vegetation. The ridges are two to four meters in height and extend in a northeasterly direction. There are depressions of various shapes and sizes filled with water or waterless. The nature of the

soil is medium-black earth with scattered strips of solonetses, saliferous soils and podzols.

The vegetation is chiefly grassy. The characteristic feature of the Barabinskaya Lesostep' is the presence of "pegs" -- small birch groves scattered among the non-wooded areas, with underbrush consisting of willows, currants, hawthorns, dog roses and bird cherry. The dimensions of the occasional birch clumps do not exceed 5 x 10 and 10 x 15.

For the purpose of studying the degree of tick infestation of the territory ticks were gathered up on a standard flag (piece of cloth 40 x 80 centimeters with a handle one meter in length) in the section of the locality which was to be treated and around it for a radius of 1.5 kilometers. The ticks were collected during the day from 8:00 am to 2:00 pm and from 4:00 pm to 8:00 pm. The number of them was recorded according to the results of collection per flag-hour.

Before the air-dusting of the locality such collections were repeated regularly every one or two days. The minimum number of ticks per flag-hour amounted to six specimens; the maximum number, to 68. In all, from 10 through 15 May 1958 1468 ticks were collected. They were all found to be representatives of the genus dermacentor of the family Ixodidae.

Part of the live ticks collected was used for the study of the species composition; the main mass was sent for bacteriological and virological examination. Two groups of ticks (39 specimens) were taken for experiment with the aim of determining their sensitivity to the 10 percent DDT dust used for the chemical spraying.

The section of the locality (Fig. 1) over an area of 750 hectares most frequently visited by people and the places where they had their permanent lodging were treated. The chemical spraying from the air was accomplished from 15-17 May 1958. A landing field, which was at a distance of 16 kilometers (by air) from the area of the locality treated was outfitted for the airplane. DDT dust was brought to the area beforehand in paper bags. A brigade of six persons loaded the toxic chemicals into the airplane. The entire group of the brigade was dressed in overalls and wore respirators. Nine hundred kilograms of DDT dust were loaded on to the AN-2 airplane at the same time, for which 8 to 10 minutes were required. [The AN-2 is a passenger airplane].

The DDT dust was sprayed from the airplane in the norming hours (before 10:00 am) and after 5:00 pm (before the sun set), with a wind velocity of from two to four meters a second, the altitude of the flight was 7 to 10

meters above the open terrain and 20 meters above buildings. The speed of the flight of the airplane was 160 kilometers/hour. The airplane took 25-27 minutes for each trip. An area of 30 hectares was treated in each trip. Thirty kilograms of 10-percent DDT dust was used for one hectare of the area. In all, 22.5 tons of DDT dust were used on the area of 750 hectares.

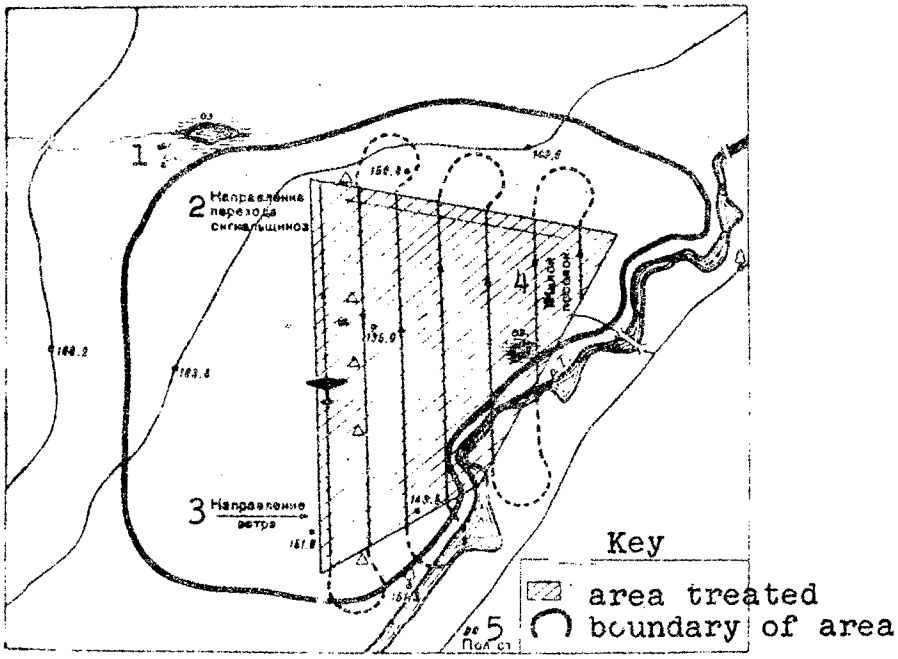


Fig. 1. Diagram of Reclaimed Area

1 -- field camp; 2 -- direction taken by signalers; 3 -- direction of the wind; 4 -- inhabited village; 5 -- field camp.

On one trip the airplane dusted a strip 45-50 meters in width (the width of the toxic wave which was formed through spraying the toxic chemical). A uniform sedimentation of the dust was observed with a wind velocity of 2.5-3 meters/second. With a wind velocity of 3.5-4 meters/second a slight spread of the toxic wave to the sides of the airplane's line of flight was noted.

The air-apraying of the locality was accomplished by the shuttle method (Fig. 1). We selected this method because, owing to the slight side-spread of the toxic wave coverage of the preceding wave by the next wave of the preparation was achieved. We consider the shuttle method of treatment to be more effective in the application of dusts

than the so-called "corral method." In our experience, the latter method is better used for emulsion treatment (aqueous suspensions). The fact that the airplane took the proper course and the accuracy of the course were indicated by three signalers. Each signaler had a signal marker measuring 150 x 75 centimeters with a handle three meters long. The marker had white gauze attached to it; it served as a flag indicating the direction of flight (the plane of the marker was placed perpendicular to the line of flight of the airplane). The signalers went from one line of flight to the next (distance of 30 meters) after the airplane had passed over them. The beginning and end of the spraying of the preparation along the line of flight were indicated from the ground. Communication with the airplane crew was carried out by means of signals and also on the landing field. The quality of the work (uniformity of spread of the toxic wave of the preparation, completeness of treatment of the locality, etc.) were checked by a person designated.

With the aim of checking the efficacy of dusting from the air during the period of treatment ticks were collected everyday in control and experimental (treated) areas. The collected ticks were put into individual test-tubes, and observation was made of them. Such tick collections were carried on every day for 10 days after the spraying from the air.

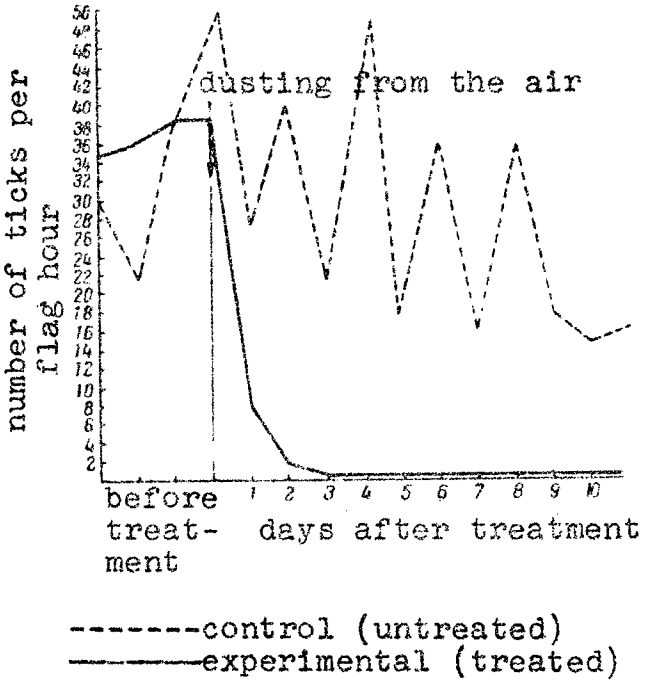


Fig. 2. Tick Census In Experimental and Control Areas.

The results of the observation of the tick census in control and treated areas of the locality are shown in Fig. 2. From the data presented it is seen that in the area treated the number of ticks decreased sharply as early as 24 hours after the dusting -- from 40 to 8 specimens per flag-hour; after another -- to two specimens per flag-hour. Beginning with the third day after treatment no ticks were encountered in the flag collections in this section of the locality, whereas in the control areas their number remained the same. The absence of ticks in the treated area was confirmed also by questioning of people who were always in this area. After the dusting from the air there were no cases of tick bites. In the control, untreated areas ticks were encountered on these days in large numbers, and they were active.

Beginning with 10 days after the dusting the ticks were collected every 7-10 days throughout the season. In the treated territory they were not found, whereas in the control areas ticks were present in every collection throughout the entire observation.

With the aim of checking the effect of the DDT dust used for the dusting on the ticks we performed an experiment with two groups of collected ticks. In the first group the ticks were collected from treated areas after contact with insecticide in the locality for various intervals of time and observation was made of them. The results of the observation of this group of ticks are shown in Table 1.

Table 1

Time of contact of ticks with treated locality	Time of observation and results on days				
	1	2	3	4	5
8 hours	+++	+	X		
24 hours	+	-	X		
48 hours	-	X			
Control ticks from untreated territory	+++	+++	+++	+++	+++

Note. Key: +++ ticks mobile; + ticks not very mobile; - ticks immobile; X death of ticks.

A second group of ticks collected on the untreated territory was exposed to contact with DDT dust for various periods of time under laboratory conditions, and then these

ticks were kept for further observation. The results of this contact of the ticks with the insecticide are presented in Table 2.

Table 2

Time of contact of ticks with treated locality	Time of observation and results on days				
	1	2	3	4	5
5 minutes	+++	+	+	-	X
10 minutes	+++	+	+	-	X
15 minutes	+++	+	+	-	X
20 minutes	+++	+	-	X	
Control ticks	+++	+++	+++	+++	+++

Note. Key: Key is the same as for Table 1.

The observations show that 10-percent DDT dust is completely insecticidal with respect to Dermacentor ticks even after brief contact with the poison, and it can be used successfully for eliminating ticks in a locality. In sanitation work in a locality and work in freeing it from ticks the locality should be cleaned of trash, the past year's high grass and weeds.

Conclusions

1. Taking into consideration the potentiality of ticks of being vectors of infections, it is expedient to carry out anti-tick measures preliminarily when people are to be housed in a locality.
2. The air spraying tick treatment method is convenient and effective; it is suitable for treating large areas.
3. The application of 10-percent DDT dust for eliminating ticks of the genus Dermacentor is completely expedient in nature.

Clinical Expressions of Pressure Trauma of the Lungs

V. V. Sosin, Major of the Medical Service

The cause of pressure trauma of the lungs is usually a rapid and marked increase in the intrapulmonary pressure or a marked rarefaction of the air (gas mixture) in the respiratory passages and alveoli when inhalation is proceeding from a closed space which contains an insufficient quantity of air (gas mixture). In either case there is a rupture of pulmonary tissue and the influx of gas into the blood stream which produces characteristic symptoms of gas embolism.

In the literature both mechanisms of occurrence of pulmonary pressure trauma have been described and everywhere the identity of the symptoms, the identical nature of the development, course and sequelae of the disease have been emphasized. As the data in the literature attest, whatever the mechanism of development of the pulmonary pressure trauma it is always accompanied by serious clinical manifestations in the form of a disorder of the cerebral circulation, a disturbance in cardiac activity and respiration.

In the present article we should like to direct attention of medical workers participating in the supervision of divers' submersions, of certain distinct factors in the course of this disease.

Correctness in diagnosing pressure trauma of the lungs is necessary for taking measures of prophylactic and therapeutic nature. The afflicted diver should be placed immediately into a compression chamber (submarine compartment).

In typical cases the diagnosis of pressure trauma of the lungs does not give rise to any difficulties. The disease is characterized by the following features: a disorder of cardiac activity and respiration in the patient, a disturbance in cerebral circulation accompanied by loss of consciousness immediately after the pressure trauma of the lungs, the excretion of a foamy bloody sputum from the mouth and nose, moist rales in the lungs, cough, etc. It is more difficult to recognize pressure trauma of the lungs which has an atypical course.

Thus, in June 1957 we had the opportunity of observing a case of pressure trauma of the lungs in sailor T., born in 1935, whose disease symptoms differed somewhat from the typical manifestations indicated in the literature. Pressure trauma of the lungs occurred as the result of a rarefaction in the apparatus-lung system.

The circumstances of the accident were as follows: supernumerary ship light divers were working out the problem

of walking along the bottom according to signals. The descents were accomplished under the supervision of the commander of battle station-U and the instructor in light diving matters; the medical care was being supervised by the ship physician. The depth of submersion was three to four meters; the bottom was solid, sandy and in places there were pits covered with algae; the water temperature was plus 10°, the air temperature was plus 19°. The submersion was carried out from a concrete wall 0.5 meter above the water in the ISA-M apparatus with a TU diving suit.

Sailor T., after a working check of his diving equipment, got into the apparatus and let himself down the ladder to the bottom. After making several steps backward he put his foot into a pit and began to fall on his back. His attempts to hold on to theend of the signal cord were unsuccessful, because he was very weak. After falling on his back, the diver first noted a deficiency and then a complete absence of the gas mixture in the breathing bag. Attempts to bring oxygen into the breathing bag with the bypass did not produce the desired result; his supine position was maintained, and the oxygen was lost into the water through the open release valve. One and a half to two minutes after falling the diver lost consciousness.

The signaler, observing air bubbles at the surface of the water over the place where the diver had gone down, at first did not pay any attention to it, but seeing that thediver did not respond to his repeated signal as to how he felt, he proceeded to bring him up to the service. The diver was lifted on to the wall by means of the signal cord in an unconscious condition. As soon as the diver was freed from his equipment he recovered consciousness. He was troubled by weakness, dizziness, black circles before his eyes, and labored respiration; in the words of the patient, it was impossible to take a deep breath. There were no pains in his chest on breating, and there was no cough.

At the physician's request he coughed several times deeply, as a result of which he excreted an insignificant amount of foamy bloody sputum. He was sent to the compression chamber with the diagnosis of pressure trauma of the lungs. Before being put into the chamber the patient was examined by the physiologist: his consciousness was clear, he was active, the mucosa of his lips was cyanotic; the conjunctivae and skin were pale; the pulse was 76 beats a minute, rhythmical, and of satisfactory quality and tension; his heart sounds were clear but slightly muffled. Respiration was regular, of adequate depth, 14-16 times a minute; on auscultation solitary, diffuse moist rales were heard. The mucosa of the oral cavity, pharynx and nose were un-

injured. The diagnosis of pressure trauma of the lungs was confirmed. In making the diagnosis the circumstances of the accident were kept in mind: his fall on his back in the presence of an open release valve on the breathing bag of the apparatus, the vigorous production of gas bubbles on the surface of the water, the condition of the ISA-M apparatus after the accident.

The patient was given a subcutaneous injection of one cubic centimeter of 20-percent camphorated oil; at 6:25 p.m. he was put into a compression chamber. The pressure in the chamber was increased to five kilograms per square centimeter. Five to seven minutes after the pressure was raised, the patient was again examined by the physiologist who was with him. He offered no complaints; he was somewhat excited. His skin and visible mucosae were of the usual color; his pulse was 60 beats a minute, rhythmical: his heart sounds were pure and muffled. Vesicular respiration was heard over the lung fields with solitary moist rales, his respiration was even -- 10-12 a minute; deep respiration was painless.

Exposure to a pressure of five atmospheres was continued for 30 minutes. The pressure was dropped according to routine No 1 of the therapeutic compression table for pressure trauma of the lungs. At the end of his stay at the last stage, which corresponded to three meters, the patient did not offer any complaints, he felt good, his pulse was 62 a minute of good quality and tension; his respiration was 12-14 a minute and regular.

After therapeutic compression the patient was put into the unit infirmary. The next day, he offered no complaints, and he felt good. After spontaneous coughing a rusty sputum was expectorated. There were no essential abnormalities found. Treatment was prescribed as follows: norsul'fazol [sulfathiazol] in a dose of 1.0 gram four times a day, 10 percent calcium chloride solution by mouth. At the end of three days after sustaining this condition the sailor was discharged to his unit in good condition.

The characteristics of the course of pressure trauma of the lungs in the given case consisted of an unusual mildness of the symptoms of the disease. The patient was unconscious a total of 1.5 to 2 minutes and recovered consciousness after being freed of his diving suit without any therapeutic help whatsoever.

A similar case of pressure trauma of the lungs according to its clinical manifestations and mechanism of development occurred in petty officer second class Kh., born 1934, while working out a problem of "going out along a buoy-rope from a depth of 10 meters" in an IDA-51 in May 1958. Before submersion the apparatus was in good working

order.

After going along the guide rope a distance of 12-15 meters from the shore, the light diver noted difficulty in breathing and shortness of breath. He attempted to change the gas mixture in the breathing bag, but could not find the by-pass. After approaching the buoy-rope the diver began his ascent, and on the mousing, which was one meter from the surface of the water, he began to flush out the breathing apparatus three times with oxygen. He could not perform the flushing correctly and simply exhaled air from his lungs; he could not find the by-pass. Soon after that he was raised out of the water in an unconscious condition and was freed from his equipment. It was found that his mouth-piece was firmly clamped with his teeth, and the skin of his face was pale.

After being freed of his equipment he rapidly returned to consciousness. He complained of a headache. When he was examined by a physician no pathological signs were found in addition to pallor of the skin. The patient was under the supervision of the physician for 30 minutes and then he was put into the crew-quarters, where he again became weak, felt a "bubbling" in his chest and excreted a foamy fluid of aloe color from his mouth. He was promptly sent on a stretcher to the medical aid station where he was injected subcutaneously with caffein, camphor, and tetanus antiserum in ordinary doses. Then a therapeutic compression was accomplished according to the first routine of the therapeutic compression table for pressure trauma of the lungs. On examination in the chamber the following were found in the patient: pulse -- 88 a minute, satisfactory tension and quality; the heart sounds were pure and clear; respiration was 17 per minute, painless; numerous moist rales were heard in the lungs. The patient could hold his breath in inspiration for 80 seconds. The outcome of the disease was complete recovery and return to duty.

The cases of pressure trauma of the lungs presented attest to the great variety in the course of this disease and require attentive observation of the submersion of divers and a detailed examination of persons suspected of pressure trauma of the lungs by the medical workers supervising the diving for the purpose of taking therapeutic and prophylactic measures.

Experience in the Organization of Fluorographic Examination of the Personnel of a Naval Base

M. Ye. Guberman, Lieutenant Colonel of the Medical Service

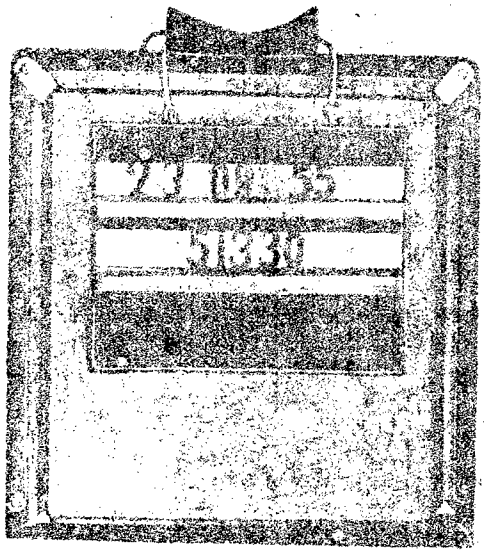
In the present report we should like to share our experience in the work of examining personnel of units and ships by the method of fluorography in the polyclinic servicing the base.

We made an examination of the personnel of the units and ships according to existing principles twice a year, according to the annual plan previously constituted and approved by the command, at such a time of the year when the personnel of the ships and units were free from having to carry out duties and were at the naval base. On the basis of this plan the flagship physicians of the large units made out their own plans in which the order of organization of the lists of examinees was clarified with an indication of the date and the time. As a rule, this work is carried out during the evening hours when the personnel is free of exercises and work. Persons who had stood watch on the day of examination were examined first.

The lists of personnel subject to examination in the units and combat units of the ships usually cannot come on the same day in full complement. Officers on duty (most often, the small unit commanders and commanders of the various services) accompany the physician or unit feldsher to the examination of the personnel. On their arrival at the place of examination the examinees are arranged according to age and are divided into groups of 50 persons each (selecting persons of approximately the same age in each group). Each group is invited into the waiting room in turn where the examinees are stripped to the waist; at this time, the feldsher or sanitation instructor of the unit who is sitting at the entrance to the fluorography room issues the fluorographic cards to the subjects, simultaneously writing in the last name, first name and patronymic as well as the number of the card issued to each sailor.

The Medical records of those who were examined are brought to the X-ray clinic the day after the examination. At this time, the data of the examination and number of the fluorogram according to the list are recorded in the medical records in the ship medical unit. The lists of those who have been fluorographed are kept in the medical section of the large unit or ship. A journal is kept in the X-ray department in which are inserted the date of the examination, the number of the military unit, the number of those being examined and the results of the examination.

After developing and fixing the fluorograms they are issued to the unit physician. An appropriate note is made in the medical records of persons in whom no pathological changes were found. A special stamp is available for this. Persons in whom various kinds of pathology are found or in whom it may be suspected according to the fluorograms are called a second time for a complete X-ray examination (for fluoroscopy and, where necessary, for roentgenography of the lungs); the final result is also entered in the medical record book. All the sick persons detected are sent to the dispensary division of the polyclinic where they are put on the records and where the necessary therapeutic-prophylactic measures are taken. For the purpose of marking the fluorographic strips we made a simple and very convenient fluorographic numerator, which we have been using now for several years.



Fluorographic Numerator in Working Position

The fluorographic numerator consists of a piece of cardboard measuring 20 x 26 centimeters which is bordered by a narrow strip of canvas and three canvas pockets two centimeters in depth which are sewn on horizontally (see Figure). Figures 3.5 centimeters in height which have been cut out of lead rubber are inserted between the pockets. The set of figures which indicates the day, month and year as well as the first number of the particular 50-membered group is placed in the upper pocket; the set of figures indicating the number of the military unit, the personnel of which is being fluorographed, is placed in the lower

pocket.

Before beginning the exposure of each 50-membered group strip the figured set of the numerator is photographed, and then the fluorography of the subjects is accomplished. After examining 50 persons the strip is cut off (for convenience in developing), and a figure set of the next unit is again inscribed on a new strip, simply changing the first number in the upper line of the set (in the upper pocket) for the new group of subjects.

In contrast to the usual method of fluorography in existence, that is, in a single projection, we take films of the subjects in two projections, posteroanterior and a separate picture of the apices of the lungs, because the latter are obtained in a narrow form on the usual fluorograms, and at times they are entirely covered by the elevated clavicles. In taking a picture of the apices of the lungs the subject is placed in the anteroposterior projection and tilted. This makes it possible to show the apices of the lungs completely and to detect any pathological changes in them. Fluorography in two projections makes it possible considerably to increase the percentage of detection of tuberculosis, especially the small, focal forms, which at times are overlooked on fluorograms taken in a single projection. During our five years of work we have become convinced that the organization and marking of fluorograms as well as our type of recording are very convenient. It seems to us that this experience may be extended also to other medical installations.

Received June 1957

The Effect of Long-Lasting Radial Acceleration on Man

V. I. Babushkin, Lieutenant Colonel of the Medical Service,
Candidate of Medical Sciences

Numerous works which have been published in the Soviet and foreign literature show that until recently the effect of radial accelerations on man has been studied only with effects lasting several seconds. At the present time, the study of the problem of the influence of longer accelerations on man is assuming great practical importance. As is well known, flights in aircraft which go at supersonic speeds and particularly flights in cosmic rockets are inevitably associated with the effect of acceleration, which effect can last for several minutes.

In flights in aircraft and in cosmic rockets the accelerations may be in a different direction with respect to the longitudinal axis of the human body. In the present article we are discussing the accelerations in which the forces of inertia act on man in the head-feet direction.

A small number of investigations has been devoted to the study of the effect of prolonged accelerations on man in the head-feet direction. From some works published in the foreign press only a general idea may be gained of the functional changes which occur in the body under the influence of such accelerations. Thus, Frankenhauser (1957) reports that 3 G accelerations are readily tolerated by man for 10 minutes. After such an effect only an insignificant reduction in visual acuity, slight fatigue and a deterioration in the performance in certain psychological tests were noted in the subjects. Miller, Mitchell, Riley, Bondurant and other authors (1958), after exposing subjects to the effect of acceleration in a centrifuge with a magnitude of from 3 to 5 G for four to 18 minutes, noted that the time for which the accelerations can be tolerated is limited chiefly by the development of general fatigue and by the occurrence of painful sensations in the area of the back and neck, and sometimes also the appearance of visual disturbances.

In our investigations, carried out in conjunction with E. V. Marukhanyan, A. B. Flekkel' and B. A. Yakubov (1958), a study was made, in addition to determinations of the time for which radial accelerations can be tolerated, of the changes in the principal physiological functions and working capacities of the subjects. With this aim in view, the action currents of the heart muscle (EKG) and of the skeletal musculature (EMG), the blood pressure in the brachial artery and in the blood vessels of the aural concha were recorded continuously. At the same time, a record was

made of the respiratory rate, and the volume of pulmonary ventilation and oxygen consumption by the body was determined. The ability to work during the effect of acceleration was investigated by means of the recording of movements of the control stick and gas sector as well as movements which imitate certain operations of the pilot in catapulting out of the plane. In a certain part of the investigations movie films were made with the aim of studying the changes in the position and the kinematics of the movements made.

The experiments were performed in a centrifuge with the participation of six subjects. Using the effect of acceleration of 3 to 6 G magnitude, more than 120 experiments were performed both with the use of ordinary flight equipment and with the use of a pressure suit.

The results of the experiments indicate the close connection between the time that radial accelerations can be tolerated and the rate of increase in them. For example, with a rate of increase of the order of 0.8 G per second accelerations of 5-6 G can be tolerated by the subjects only for several seconds. With a rate of increase which does not exceed 0.2 G per second the time of possible tolerance of the accelerations is increased considerably. In this case, accelerations of 6 G magnitude could be tolerated by the subjects for one to three minutes. The time of tolerance of the 5 G accelerations ranged from 5 to 10 minutes in different subjects, and of accelerations equal to 4 G ranged from 10 to 15 minutes. The effect of accelerations of 3 G was tolerated for 20 minutes by all the subjects without any essential change in their general condition or working capacity. These data and the reports of the subject made it possible to suppose that accelerations of 3 G magnitude can be tolerated for more than 20 minutes. Miller, Bondurant and other authors came to the same conclusions. According to their data, certain subjects are capable of tolerating 3 G accelerations for one hour.

We and the authors mentioned have noted that the main factor which determines the time of tolerance of accelerations is constituted by the signs of fatigue and painful sensations in the muscles of the back and neck. These symptoms increase markedly with the increase in the effective accelerations, and in the sixth-seventh minute of the acceleration effect 5 G becomes difficult to tolerate. Here, is difficult to keep the head in the position necessary for work, and it bends markedly forward. This can be judged both by the reports of the subjects and by the data of the movie films. Vigorous elevation of the head always leads to visual disturbances. This symptom apparently is brought

about by a marked reduction in the blood pressure in the cerebral blood vessels and by the development of insufficiency in the retinal blood supply.

An analysis of the oscillographic recordings shows that during a 20-minute effect of a 3 G acceleration no essential changes are found in the principal physiological functions of the body. Moderate changes observed in the activity of the cardiovascular system, respiration and skeletal musculature are of a compensatory nature and are most pronounced chiefly in the initial period of the effect. With the continuance of the effect of the acceleration a certain tendency is noted toward normalization of the changes (Fig. 1).

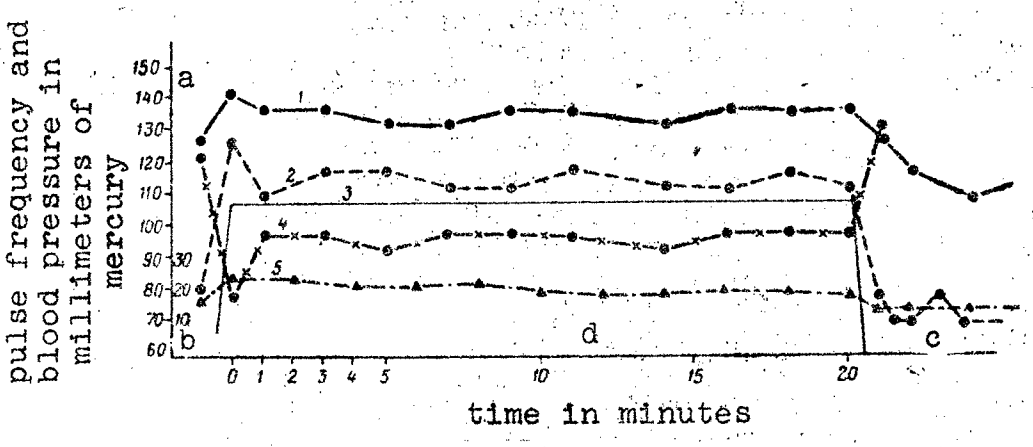


Fig. 1. Dynamics of Changes in Pulse, Blood Pressure and Respiration During A 20-Minute Acceleration Effect of 3 G Magnitude: 1 -- systolic pressure in the brachial artery; 2 -- pulse rate; 3 -- accelerations; 4 -- systolic pressure in the blood vessels of the aural concha; 5 -- respiratory rate.

a -- respiratory rate; b -- before the experiment; c -- after the experiment; d -- with the effect of acceleration.

With accelerations of 4 G magnitude acting for 10-15 minutes a greater compensatory elevation of the blood pressure in the brachial artery is noted with a more pronounced increase in the pulse rate. Despite this, the blood pressure in the blood vessels in the upper half of the body, particularly in the vessels of the aural concha, is reduced to a greater degree than during 3 G accelerations.

Changes in the functions studied increase with the increase in the effective acceleration. With the effect of an acceleration of 5 G magnitude the pulse rate increases

compared with the original by 70-80 beats a minute and not uncommonly reaches 180 beats a minute. The systolic blood pressure in the brachial artery increases to 160 beats a minute. The systolic blood pressure in the brachial artery increases to 160 millimeters; in the arteries of the aural concha it decreases to 50-40 millimeters, which indirectly indicates a considerable reduction in the cerebral blood vessels.

An analysis of the electrocardiograms taken in the first standard leads shows that with the effect of 5 G accelerations and along with a more pronounced tachycardia the deviation of the electrical axis to the right is more pronounced compared with what is obtained after the effect of 4 G accelerations. The degree of expression of the changes is different in different persons. In those who are not so resistant to accelerations a greater deviation of the electrical axis to theright is observed simultaneously with a more pronounced tachycardia than in persons who are more resistant to acceleration. A comparison of these data makes it possible to suppose that this difference in the deviation of the electrical axis of the heart is closely related to the physical development of the subjects. Apparently, the degree of tension of the abdominal muscles is of essential importance; this is confirmed distinctly by the results of electromyographic investigations.

With the effect of 5 G accelerations we noted more substantial changes in the respiration of the subjects. Specifically, the volume of pulmonary ventilation in the fifth minute of the acceleration effect increased from 8.0-8.5 liters (in the original state) to 16-17 liters a minute. In the next five minutes of the effect, as a rule, a further increase in pulmonary ventilation was observed. While the quantity of oxygen consumed by the subjects in the starting state amounted to 320-340 cubic centimeters, in the fifth and tenth minute of the effect it increased, respectively, to 450 and 560 cubic centimeters. Therefore, with the continuance of the acceleration effect of 5 G a further increase is noted in the body's energy losses. An analysis of the records obtained shows that the quality of work accomplished by the subjects under these conditions decreases considerably. Thus, in the fifth minute of the effect of this acceleration the time of accomplishing the movements with the control stick was increased by an average of 15 percent, and their amplitude increased by 25 percent compared with the original figures. The time necessary for accomplishing certain movements connected with catapulting was also increased considerably. A reduction and sometimes a complete disorder of the working capacity at 5 G accelerations fre-

quently occurs as a result of a visual disorder. (See the article by A. B. Flekkel' and E. V. Marukhanyan in the present issue of the Journal).

The data obtained permits us to draw the conclusion that the necessary level of human working capacity with an acceleration effect of 5 G may be maintained only for five to seven minutes. In this connection, it was interesting to study the influence exerted by the pressure suit on the time of tolerance of the accelerations. As a result of the investigations it was shown that the PPK-1 pressure suit is effective only for acceleration effects which exceed 3 G. The use of the PPK-1 at an acceleration of 4 G or higher makes it possible to tolerate a longer period of acceleration than in ordinary flight equipment. The typical changes in certain indices of the cardiovascular system function with the acceleration effects of 5 G before and after use of the PPK-1 are shown in Fig. 2.

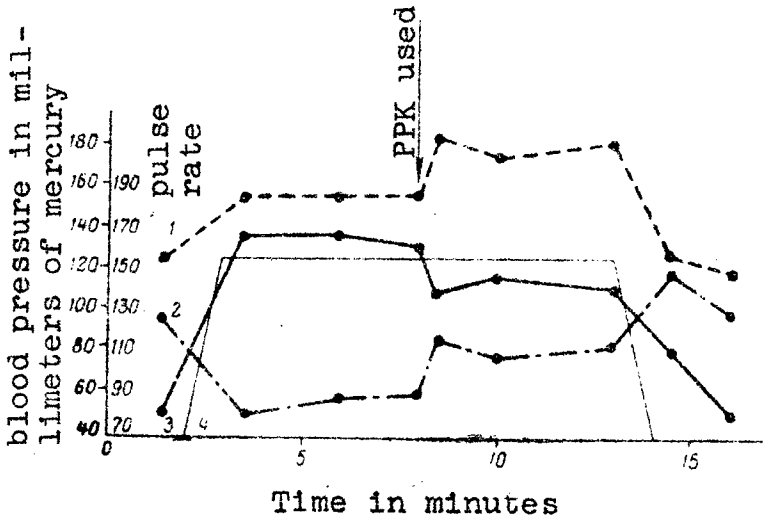


Fig. 2. Dynamics of Changes of Pulse and Blood Pressure With the Effect of 5 G and With the Use of the PPk-1.

Key: 1 -- systolic pressure in the brachial artery; 2 -- systolic pressure in the vessels of the aural concha; 3 -- pulse rate; 4 -- acceleration.

We noted that the omission of the PPK-1 suit with accelerations of 4 G and particularly of 5 G always leads to a marked reduction in the blood pressure, which in its turn brings about a complete visual disorder and disruption of the working capacity of the subjects.

The high degree of efficacy of the PPK-1 is confirmed by data dealing the changes in the respiration and energy losses of the body. In the Table presented the dynamics of changes in the quantity of oxygen consumed with the effect of 5 G acceleration are presented depending on the use of the PPK. This data show that in the first five minutes of the acceleration effect without use of the PPK the quantity of oxygen consumed by the body increases from 380 to 500 cubic centimeters a minute. In the next five minutes of the acceleration effect without use of the PPK the quantity of oxygen consumed by the body increases from 380 to 500 cubic centimeters a minute. In the next five minutes the oxygen consumption is increased by another 180 cubic centimeters a minute.

Magnitude of acceleration	Quantity of oxygen consumed in cubic centimeters						
	During the effects of accelerations				After the effect of acceleration		
	before acceleration effect	in the 5th min.	in the 10th min.	in the 15th min.	after 3 min.	after 6 min.	after 9 min.
4 G without PPk.....	360	450	400	390	400	300	280
4 G with PPK-1....	340	400	400	380	340	300	300
5 G without PPK.....	380	500	680	-	450	350	300
5 G with PPK-1....	400	450	530	-	350	300	300

With the use of the pressure suit the quantity of oxygen consumed was 50-150 cubic centimeters less, which attests to the lesser energy losses by the body under these conditions. All this material is in agreement with the reports of the subjects to the effect that with the use of the PPK-1 4-G accelerations and higher are tolerated more readily and for a longer time than without it.

In analyzing the data presented the high degree of adaptibility of the human body to the prolonged effect of radial accelerations can be noted. Here, the degree of adaptibility is inversely proportional to the rate of increase of the acceleration. The centrifugal forces, by exerting a mechanical effect on man, can directly reduce his

ability to work. However, the effect of centrifugal forces is unfavorably reflected on the working capacity also through changes in the central nervous system activity, which are produced primarily by disturbances in the circulatory system. This situation is confirmed by the possibility of longer tolerance of radial accelerations with the use of a pressure suit. On the basis of the investigation it may be considered that the pressure suit is effective not only in the initial period of acceleration effect, that is, in the period where the reflex vascular reactions have not yet fully developed, but also during the period of the prolonged acceleration effect, at which time a reduction in the activity of compensatory mechanisms of the body can occur as a result of a prolonged strain on them. Among the mechanisms of the protective effect of the PPK, particularly for the prolonged effect of accelerations, the fixation of the movable internal organs is apparently of great importance, protecting them against displacement. This in its turn brings about a reduction in the abnormal efferentiation from them, which has an unfavorable influence on the functional state of the central nervous system. Therefore, the use of the PPK with the effect of prolonged accelerations is just as effective a measure for increasing human tolerance as it is after the effect of accelerations of lesser duration.

The Influence of Long-Acting Accelerations on Certain Human Visual Functions

A. B. Flekkel', Colonel of the Medical Service,
Candidate of Medical Sciences
E. V. Marukhanyan, Lieutenant Colonel of the Medical Service,
Candidate of Medical Sciences

Human visual functions during the effect of prolonged accelerations have been little studied. The conditions of vision with the effect of accelerations is usually evaluated by subjective, very indefinite human sensations in the form of the occurrence of a "whitish fog," "grey or black shroud" in the visual field, etc. Such a characterization of the condition of vision does not permit a quantitative evaluation of the changes in visual function depending on the magnitude and time of effect of acceleration or a comparison of them with the changes in the other human physiological functions.

The present work was devoted to a study of the influence of radial accelerations within limits of 3-5 G and of different durations on the visual acuity and the capacity of discriminating colored signals. The investigations were carried out with the use of the usual flight suit and with a pressure suit in the centrifuge. The rate of increase of the acceleration was maintained within limits of 0.1-0.3 G/second.

Visual acuity was determined by means of a reduced photographic reproduction of the Kholina Table which was set at the eye level of the subject at a distance of 94 centimeters. The investigation was carried out with constant artificial illumination of the Table, which in its center part amounted to 650-700 luxes. Visual acuity was measured before rotation of the centrifuge, during the course of operation of the acceleration, as well as after stopping the centrifuge. At the experimenter's request the subject was to decide the direction of break in the rings in various lines of the Table which were numbered with large figures. Visual acuity was evaluated by the value of the angular measure of the symbols of the line, on reading which no more than a single error was permitted.

The discrimination of color signals was accomplished under conditions of poor illumination, such as applies to a moonless night, by means of airplane lamps of red, green, violet and white color. The signals were arranged outside the centrifuge chamber, were lit from the experimenter's control desk and were presented one by one and in different orders. Each signal was exposed for two-three seconds using an interval of one-two seconds. Under conditions where

the centrifuge was rotating such an exposure time permitted an observation of the signal for no more than one second. The quality of the color discrimination of the signals was checked by the experimenter, who possessed normal color vision. As with visual acuity, the discrimination of the signals was carried out during the course of the acceleration effect as well as before and after rotation of the centrifuge.

The experimenter's instructions and the results of discrimination of the Table symbols and color signals were transmitted over an interphone system.

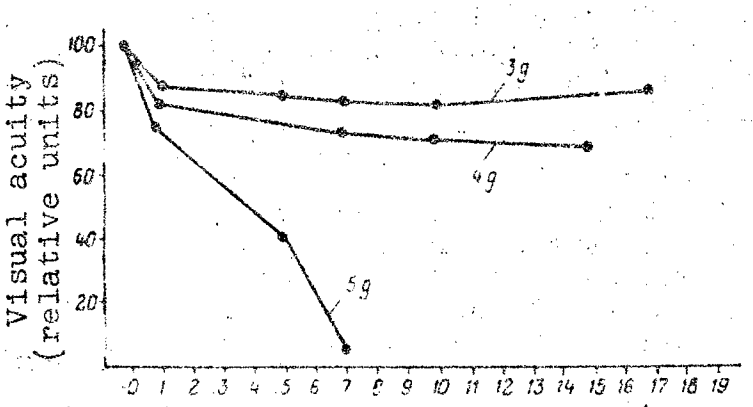


Fig. 1. Change in the Visual Acuity After the Effect of Radial Accelerations of Different Magnitudes.

The investigations were carried out on three healthy persons who possessed normal central and peripheral visual functions. In all, twelve investigations were made. In Fig. 1. the change in visual acuity is shown after the effect of different degrees of acceleration. From the Figure it is seen that after the effect of a triple overload [3 G] the greatest reduction in visual acuity was observed during the first minute and amounted to 11 percent of the original level. After this, the visual acuity dropped in a smoother manner, and in the seventh minute the reduction amounted to 18 percent. A further 3 G effect not only did not cause any reduction in visual acuity but a tendency was even observed toward a restoration of it to normal. Complete recovery of the visual acuity of the subjects occurred two minutes after the conclusion of the centrifuge rotation. The stabilization and recovery of a somewhat reduced visual function observed during rotation in the centrifuge at an acceleration of 3 G is probably the result of compensatory reactions of the vascular system which come into play at this time as a response to the circulatory disorder which

occurs.

Considerably greater changes in the visual acuity were observed with accelerations of 4 and 5 G. Thus, in the first minute of rotation of the centrifuge the visual acuity dropped off by 17 percent with 4 G acceleration, and 25 percent for 5 G. To a still greater degree a difference was detected in the change in visual acuity with relationship to the magnitude of acceleration in respect to the duration of its effect. For example, in the seventh minute of rotation of the centrifuge the visual acuity dropped by 25 percent with an acceleration of 4 G, and with an acceleration of 5 G magnitude it was almost completely lost.

In absolute values the visual acuity at the time of its maximum reduction amounted, an average for all the subjects with a 3 G acceleration, to 0.97; 4 G, 0.7; and 5 G, 0.05. [It will be remembered that in the Soviet Union the decimal system is used in place of our fractional system for measuring visual acuity]. Taking into consideration the fact that the outlines of airplane instruments appear much greater than one angular minute to the flier, a visual acuity of 0.7 may be considered practically adequate under these conditions. Hence, it follows that visual orientation of the pilot in the airplane cockpit may be assured for 10-15 minutes with the effect of acceleration of no more than 4 G.

The data obtained give us the grounds for supposing that with a slow increase in the radial accelerations of moderate magnitudes the visual disorders are associated with a disturbance in the circulation of the peripheral portion of the visual analyzer. A normal circulation of the eye, as is known, may be realized only in the event the pressure of the blood reaching the eye exceeds the intraocular pressure at least by a little. Because the latter normally amounts to about 22-23 millimeters of mercury, evidently a reduction in the blood pressure in the central artery of the retina below the value of the intraocular pressure produces anoxic conditions in the eye. It has been established experimentally that visual disorders occur with the reduction in blood pressure in the carotid artery below 50 millimeters, and complete loss of vision occurs with a reduction in the pressure below 20 millimeters (S. S. Golovin).

Evidence to the effect that visual disturbances found during the effect of radial accelerations were caused by a disturbance in the circulation of the retina is constituted by data concerning the reduction in blood pressure in the vessels of the aural concha. (See V. I. Babushkin's article in the present issue of the Journal). Therefore, changes in visual acuity under the influence of different magnitudes of long-acting accelerations were closely related to the

changes in blood pressure in the cephalic blood vessels.

In Fig. 2. the efficacy of application of the pressure suit for an acceleration of 5 G magnitude is shown. In the Figure it is seen that in the fifth minute of action of such acceleration the visual acuity decreased by 65 percent. Use of the PPK provided a gradual recovery of visual acuity almost to the original level. In another experiment in the same subject the visual acuity was completely lost in the seventh minute of the effect of this G magnitude. Use of the pressure suit in this case led to a complete restoration of it to normal. The efficacy of the pressure suit is illustrated even more clearly in Fig. 3. While the use of the pressure suit in the fifth minute of 5 G acceleration brought about a recovery in the visual acuity from 50 to 80 percent of the original level, subsequent omission of the suit during the operation lead to a complete loss of vision.

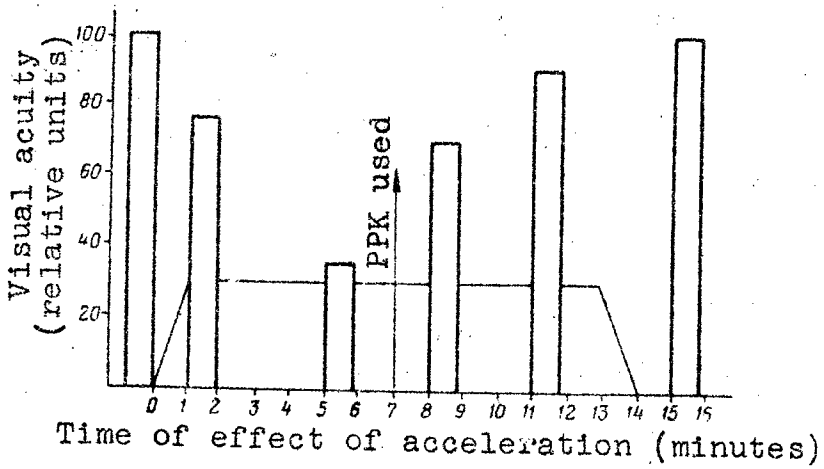


Fig. 2. Visual Acuity After the Effect of 5 G Acceleration With the Use of a Pressure Suit.

As the investigations showed, accelerations of 3-5 G magnitude did not exert any harmful effect on the results of color discrimination. The subjects recognized all the colors of the signals offered without error during the effect of these acceleration magnitudes. This, however, did not exclude the possibility of change in the color sensitivity of the visual analyzer under the influence of 3-5 G accelerations. Taking into consideration the fact that the prolonged effect of acceleration reduces the visual acuity, it should be supposed that this external factor should have a corresponding influence on the color sensitivity of the eye, because color perception and visual acuity are functions of the central portion of the visual analyzer. It

is known, for example, that under the influence of even a small degree but prolonged anoxia in the pressure chamber or at mountain altitudes the visual acuity and the color sensitivity of the eye are changed to the same degree (N. A. Vishnevskiy and B. A. Tsyrlin, Ye. M. Belovstotskiy and others). Based on the fact that retinal anoxia occurs with the effect of radial accelerations in the head-pelvis direction, it should be expected that in this case also, particularly after prolonged accelerations a disorder in color perception should also occur. What has been stated, however, does not contradict the data obtained in the present work, because the strength of the stimulation produced by the color signals was considerably higher than the threshold of color perception. Hence it follows that these data maintain their significance for flight practice in which the need is always encountered for discriminating color signals.

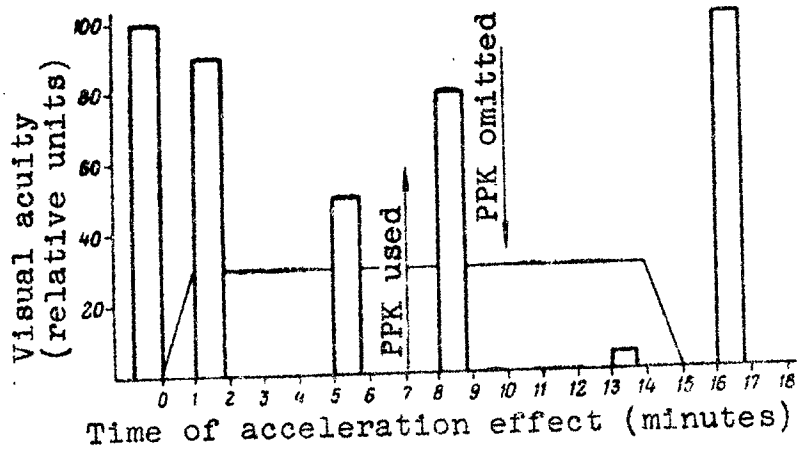


Fig. 3. Change in Visual Acuity With the Acceleration Effect of 5 G With Use and Omission of the Pressure Suit.

Conclusions

1. Under the influence of radial accelerations visual acuity decreases with the increase in its magnitude and time of its effect. In the seventh minute of the acceleration effects of 3 G the visual acuity decreases by 18 percent; at 4 G, by 25 percent; with accelerations of 5 G magnitude it is almost completely lost.

2. Visual acuity can be maintained at a level which in practice assures visual orientation in flight without any means of external compensation in accelerations of no more than 4 G for 10-15 minutes.

3. The use of a pressure suit during the effect of

radial accelerations of 4-5 G assures the maintainance of the original state of visual acuity.

4. Radial accelerations of 3-5 G for 7-20 minutes do not exert any harmful effect on the discrimination of color signals.

The Effect of Radial Accelerations on Fliers with Neurocirculatory Asthenia of the Hypertensive Type

Professor Ya. A. Rosin
G. P. Mikhaylovskiy, Lieutenant Colonel of the Medical Service, Candidate of Medical Sciences
P. M. Suvorov, Captain of the Medical Service, Candidate of Medical Sciences

A study of the body's reaction to the effect of acceleration is of great practical importance, particularly for fighter aircraft, where the flier is exposed to the effect of radial accelerations.

The initial appearance of visual disturbances (gray, and subsequently black "shrouds") is usually taken as one of the indices of resistance to accelerations acting in the direction head to pelvis. The diagnostic importance of this subjective symptom is undoubted, because it, as a rule, is a precursor of loss of consciousness when the acceleration effects are continued. However, the visual disorder from the effect of acceleration is a limit which attests to the fact that the threshold of resistance of the human body have been exceeded. Therefore, it would be of great value, particularly for the flight medical evaluation board, if we could get an idea of the physiological reactions and symptoms which indicate weakening of the functional capacities of the body even before the occurrence of visual disorders.

Recently, through the investigations of P. K. Isakov, V. I. Babushkin, V. B. Malkin, V. V. Usachev (1958) it has been shown that through the effect of radial accelerations of definite magnitude the electrical activity of the muscles of the thigh and abdominal press is reduced. This is evidence, in the authors' opinion, of a weakening in the compensatory possibilities of the body. A study of other electrophysiological processes, particularly of the action potentials of the brain and of the heart are also of great interest. The problem of the electrical activity of the brain has been least discussed in the literature.

Jasper and others (1942) established the existence of biphasic changes in the electrical activity of the brain in cats and monkeys from the effect of acceleration. At the beginning, when the pressure in the carotid artery was at comparatively high levels, an increase was observed in the electrical activity. Afterwards, with the fall in the blood pressure in the carotid artery of the monkeys to 50-60 millimeters of mercury, the cortical reaction to light stimulation of the retina disappeared; with the decrease in

the arterial pressure to 25 millimeters the spontaneous electrical activity of the cerebral cortex disappeared. The authors believe that the first phase of change in the electrical activity reflects the development of the excitation processes in the central nervous system which are subsequently replaced by cortical inhibition associated with the development of depression of the cerebral action currents.

K. G. Bergin (1949), dealing with an evaluation of the electroencephalographic data (EEG) points only to the absence of pathological changes in it from the effect of acceleration, without going tinto any details or description. Kerr and others (1944, 1945), in an examination of 542 flight students, established the fact that in the majority of cases no essential changes are noted in the EEG taken during the visual disorders. Only when the subjects were unconscious did slow waves appear. The authors could not find any essential difference between the EEG taken during the period of convulsions and the EEG taken during a loss of consciousness.

Problems of changes in the cardiac electrical potentials from the effect of radial acceleration have been discussed in greater detail in the literature (Kh. V. Dirinsgofen, 1933; S. Ruff, 1938; and others). Usually, during the effect of centripetal accelerations sinus tachycardia, a reduction in the voltage of the R_{1-2} and T_{1-2} waves, and an increase in the size of the S wave appear on the electrocardiogram. These changes depend, in the opinion of the authors mentioned, on a deviation of the cardiac axis to the right, an increase in the sympathetic effects on the heart and changes in the degree of filling of the heart cavities with blood. O. Hower and A. A. Sergeyev (1957) also observed a drop of the ST interval below the isoelectric line during the period of acceleration effect, and they considered this phenomenon related to a possible coronary insufficiency. Other authors (Franks, Kerr, and others 1945; V. B. Malkin, 1957) believe that the EKG changes are not specific for the effect of radial accelerations.

Whereas the reaction of a healthy person to the effect of acceleration was investigated in comparative detail the influence of accelerations on a person having various disturbances has practically not been studied at all. Therefore, we haveposed ourselves the problem of studying the tolerance of radial accelerations by people suffering from neurocirculatory asthenia of the hypertensive type.

Flight personnel between 22 and 35 years of age considered suitable for flight work without restriction were

used for the examination in the centrifuge. The examination was carried out two to three hours after breakfast. In the experiments an investigation was made of the effect of 3, 5, 6 G acceleration lasting 30 seconds after the time the given acceleration magnitude was attained. The interval between rotations was five to seven minutes.

Before and after the examination the blood pressure was measured (with an oscillograph). The action currents of the heart (in the anterior lead taking according to the Nebou method) and of the brain (EEG recorded by bipolarly from the left fronto-occipital area) and the pulse rate were recorded before, during and after the experiments.

For the purpose of determining the alpha-rhythm reaction to light the EEG was recorded with eyes closed and with the eyes opened. At the time of giving the command: "close your eyes" the EKG channel was excluded, and a straight line was recorded on the strip.

The EKG and EEG records taken during the effect of the acceleration consisted of the following parts: after 10 seconds there was a five-second EKG and EEG taken with open eyes; in the next 10 seconds only the EEG was recorded with the eyes closed; finally, in the last five seconds, a record was made of the EKG and EEG with the eyes open.

Communication was carried out with the subjects by means of the aircraft interphone system and by light signals. If one of these types of communication did not function properly the experiments were stopped. Observations were made concerning the condition of visual perception. For this purpose, the subject was told to observe his perception of the outline of the white cross during the rotation which had been drawn on the cross-bar of the seat at eye level. The subject was to report any disturbances in the perception of the outlines of the cross, the appearance of haziness, partial or complete "disappearance" of it and other disturbances both in visual perception and in the general feeling of well being.

We examined 13 healthy persons (first group) and 10 persons with neurocirculatory asthenia of the hypertensive type (second group). All the persons examined tolerated radial accelerations of 3, 5, and 6 g for 30 seconds well. Only in the subject B from the first grop was there noted a brief visual disorder in the 12th-15th second of rotation at 6 G. During the investigation in the centrifuge the pulse quickened considerably in all the subjects (see Tables 1 and 2).

From Table 1 it is seen that with the increase in the magnitude of acceleration an increase in the pulse rate developed in only two subjects in the first group (D. and

V.). With an acceleration of 5 G the pulse increased in frequency compared with the acceleration of 3 G in five subjects; in two it did not change; in two it became slower. At an acceleration of 6 G the pulse became more rapid than at 5 G in four subjects; did not change in four; and became slower in two.

Table 1

Subjects	Pulse rate before examination	Pulse rate with acceleration		
		3G	5G	6G
K.	64	-	160	168
G.	108	144	-	156
U.	84	168	168	170
K.	90	-	156	156
D.	78	144	150	172
V.	84	144	135	132
B.	84	132	132	120
N.	84	132	125	132
R.	112	156	185	185
T.	84	-	-	168
V.	84	144	150	156
P.	84	132	144	-
L.	90	132	144	144

Table 2

Subjects	Pulse rate before examination	Pulse rate with acceleration		
		3G	5G	6G
M.	96	165	175	175
P.	72	-	150	166
P.	73	120	125	148
K.	73	150	165	175
P.	75	130	125	142
T.	85	143	160	166
P.	94	143	150	162
S.	88	150	160	158
Ch.	90	150	160	166
K.	77	90	140	160

Table 2 shows a more regular influence of the magnitude of acceleration on the pulse rate in subjects of the second group. With an acceleration of 5 G the pulse slowed up in only one person compared with the pulse at 3 G. With an acceleration of 6 G the pulse did not change compared with that at 5 G in two persons. Therefore, in fliers with asthenia of the hypertensive type the increase in pulse frequency was more pronounced with the increase in the magnitude of acceleration.

After the effect of acceleration the blood pressure increased in all the subjects, particularly in the second group. An increase in blood pressure occurred in direct relationship to the magnitude of acceleration. The restoration of blood pressure to the original figures occurred, as a rule, five minutes after the rotation, and in individual subjects, 3-10 minutes. In subjects usually immediately after the experiment the systolic and diastolic pressure increased; then the second phase occurred -- the blood pressure dropped; in the third phase the systolic pressure remained reduced, and the diastolic pressure increased again; and finally, a fourth phase occurred in which the blood pressure dropped again.

This reaction of the blood pressure characterizes, on the one hand, a recovery of the cardiac activity (gradual reduction in the systolic pressure), and on the other, a wave-form change in the blood vessel tone (second diastolic pressure increase).

In subjects with neurocirculatory asthenia of the hypertensive type there was a certain difference in the structure of the blood pressure reactions in comparison with those in healthy persons. Depending on the magnitude of the arterial pressure we distinguish three groups: those with normotension -- under 135/85 millimeters; systolic hypertension -- systolic pressure above 135, diastolic of 85 or lower; area of hypertensive disease -- over 135/85 millimeters (see Table 3).

Table 3

Group of subjects	acceleration magnitude in G	no of measurements of blood pressure	blood pressure within normal limits	systolic pressure increased	blood pressure increased
Healthy	3	31	9	10	12
	5	34	8	5	21
	6	33	6	8	19

Table 3 [continued]

Group of subjects	acceleration magnitude in G	no of measurements of blood pressure	blood pressure within normal limits	systolic pressure increased	blood pressure increased
Subjects with neurocirculatory asthenia of the hypertensive type.....	3	43	3	9	20
	5	37	2	2	33
	6	44	1	8	35

In both groups after the effect of 5 and 6 G accelerations, the "area of hypertensive disease" (increased systolic and diastolic pressure) is encountered more often than after the effect of 3 G accelerations; in persons with neurocirculatory asthenia of the hypertensive type under these conditions a normal blood pressure is encountered much less often than in healthy persons. Even in those persons with neurocirculatory asthenia in whom there was a normal blood pressure before the investigation, it was increased after the experiment. From this it follows that rotation in the centrifuge apparently can constitute a functional test for the detection of the hypertensive reaction in persons whom it is not observed under ordinary conditions. This problem requires special investigation.

During the effect of radial acceleration the EKG in all the subjects was characterized by sinus tachycardia, a confluence of the T and P waves, which excludes the possibility of determining the duration of the PQ and QRS intervals in a number of cases (Figs. 1 and 2).

Before the investigation the EEG in the first and second groups was characterized by a well expressed alpha-rhythm, which was depressed on opening the eyes. The beta-rhythm was expressed in all cases but was different in amplitude and frequency (Fig. 1 and 2). During the effect of acceleration of 3 G the alpha-rhythm continued to be well expressed in some cases; in others, it became inconstant. In addition, an increase was sometimes observed in the alpha-rhythm as far as amplitude is concerned, and there was no depression of it in response to light. With the effect of

5 and 6 G accelerations the alpha-rhythm in some cases became inconstant; in others, it was absent. The beta-rhythm increased in proportion to the magnitude of the acting acceleration. The increase in the electrical activity of the brain in a number of cases was accompanied by various peak-like formations. They were usually observed after 5 G or 6 G accelerations and were not seen after 3 G accelerations.

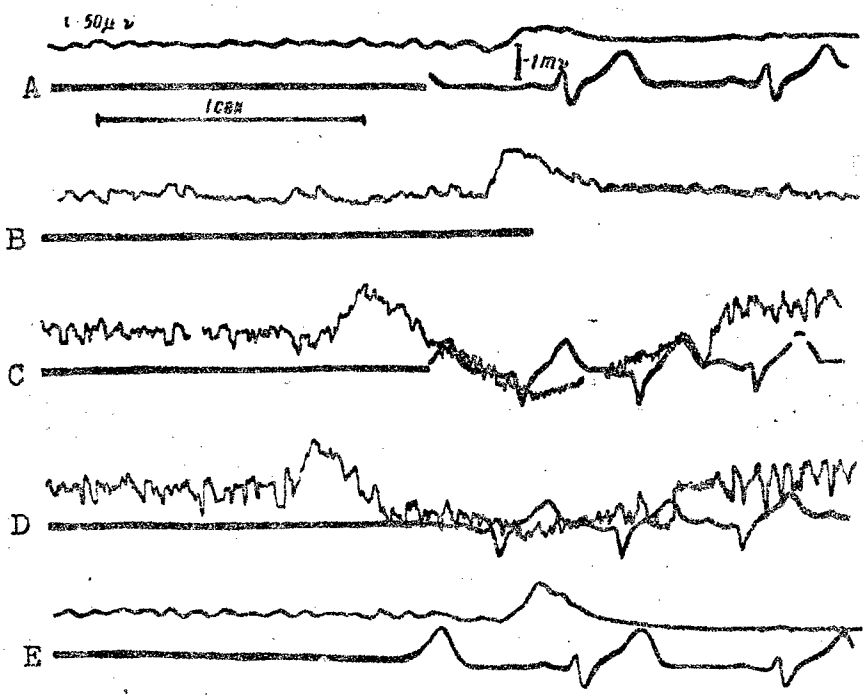


Fig. 1. Curves of EEG and EKG Records in a Healthy Person (Subject B) With the Effect of Acceleration.

A -- before the experiments; B -- with acceleration of 3 G; C -- 5 G; D -- 6 G; E -- after 6 G accelerations.

Similar EEG changes have been observed in the first stages of development of anoxia by A. G. Kuznetsov and O. G. Gazenko, G. V. Altukhov and V. B. Malkin and at the beginning of bleeding by G. D. Smirnov and V. A. Negovskiy.

The EEG changes which we observed under the influence of radial accelerations apparently can be explained also by anoxia occurring in response to a circulatory disturbance in the brain which develops in the case of a cranio-caudal direction of the acceleration.

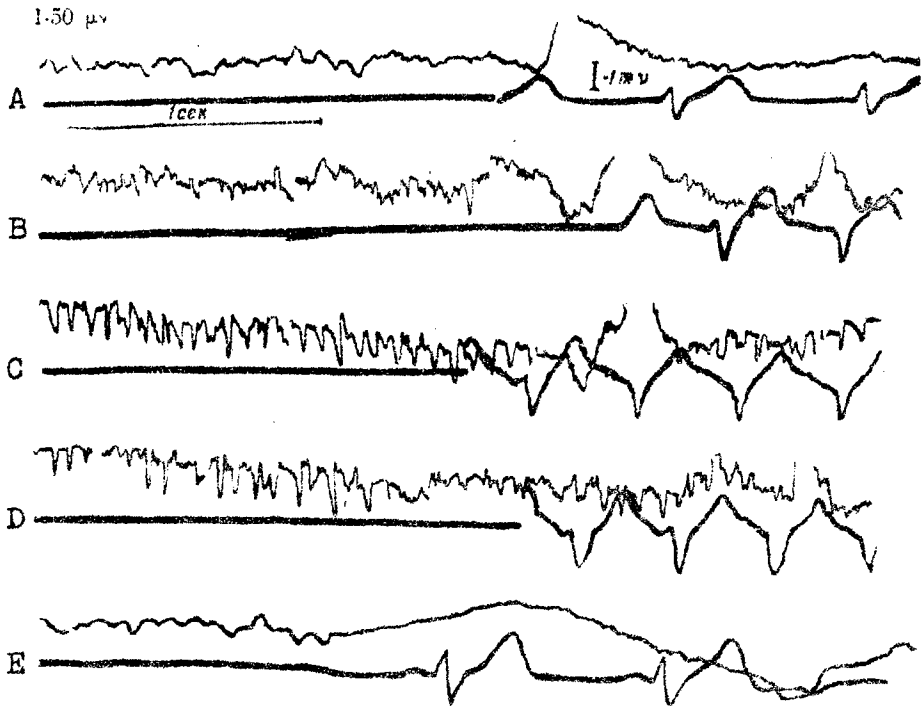


Fig. 2. Curves of EEG and EKG Records in Subject T with Neurocirculatory Asthenia of the Hypertensive Type.

(Key is the same as for Fig. 1).

Our investigations permit us to draw the following conclusion. The subjects with neurocirculatory asthenia of the hypertensive type tolerate the effect of 3, 5 and 6 G accelerations lasting 30 seconds well. At the time of the effect of the acceleration the increase in pulse frequency in them was more pronounced compared with healthy persons depending on the magnitude of acceleration. After the effect of acceleration the blood pressure increases in both healthy persons and persons with neurocirculatory asthenia of the hypertensive type. However, the increase in blood pressure in the latter was more stable and pronounced. During the effect of accelerations the electrocardiogram is characterized chiefly by sinus tachycardia. On the EEG an increase in the amplitude of the alpha-rhythm was observed, an increase in the beta-rhythm with respect to frequency and the occurrence of peak-like processes in a number of cases. The centrifuge investigations, it must be supposed, can to a certain degree serve as a functional test for the detection of latent hypertensive reactions in flight personnel.

Neurolytic Mixture ["Lytic Cocktail"] in the Prophylaxis of Anaphylactic Shock and Post-Transfusion Reactions

M. A. Slastikhin, Major of the Medical Service

Heterogeneous protein blood-substitutes for parenteral nutrition used at the present time have defects along with their positive qualities. The infusion of these solutions is not uncommonly accompanied by complications, among which the complications of anaphylactic nature are particularly dangerous. The percentage of complications, according to the data of various authors, varies from 3.4 to 44.7.

As is well known, the work in looking for methods of preventing and treating anaphylactic shock and post-transfusions complications has been conducted for a long time. In the prophylaxis of anaphylactic shock the Bezredka method has been found to be most practical and effective. However, specific desensitization according to the Bezredka method does not always protect against the development of anaphylactic shock (V. V. Kosmachevskiy, V. I. Popov).

Recently, chemo-pharmacological preparations which reduce the excitability of the central nervous system have begun to be used progressively more frequently for the prophylaxis of anaphylactic complications. With this aim in view, 0.5 percent novocain solution in a dose of 5-20 cubic centimeters intraveneously is used most extensively before the transfusion of blood and blood-substances (O. F. Saksen, L. N. Pushkir' and A. I. Tarakanov, Ye. I. Gudkova, D. A. Arapov and K. S. Simonyan and others).

In the hospital of general surgery of the Military Medical Order of Lenin Academy imeni S. M. Kirov curare-like preparations have begun to be used for the prophylaxis of anaphylactic reactions (V. I. Popov, P. K. D'yachenko, F. P. Lasta).

Based on the current concept of anaphylaxis, underneath which lie reflex disturbances on the part of the nervous system, as is well known, we posed the problem of elucidating the effect of a neurolytic mixture on prophylaxis and treatment of anaphylactic shock. The mixture included the following ingredients: thorazine two percent, 0.5 cubic centimeters; pentamin [methyliminodiethylene bis ethyldimethyl ammonium bromide: ganglion blocking agent] two percent, 0.5 centimeter; promedol [4-phenyl-4-propoxy-1, 2, 5-trimethylpiperidine hydrochloride] two percent, 0.5 cubic centimeter; dimedrol [benadryl] two percent, 0.5 cubic centimeter; vitamin B_1 five percent, 1 cubic centimeter.

The experimental investigations were made on 126 rabbits (Table 1). For the purpose of reproducing anaphylactic

shock normal steer serum, therapeutic Belen'kiy serum [cattle blood preparation used as a plasma substitute], and enzymatic heterogenous protein hydrolysate, aminopeptide-2 and others were used as the sensitizing reacting agents. The sensitization was accomplished twice subcutaneously with a dose of one cubic centimeter using an interval of 7-10 days; the reacting dose of the antigen (five cubic centimeter per kilogram of weight of the animal for the natural steer serum and 10 cubic centimeters for therapeutic Belen'kiy serum and aminopeptide-2) was injected intravenously on the 7-10th day after the last subcutaneous injection of these preparations. In part of the experiments the reacting dose of aminopeptide-2 was injected on the 12th-15th day.

The antigen was injected into the marginal vein of the rabbit ear in one to two minutes. Blood pressure and respiratory changed were recorded on a kymograph by the usual method. The prophylaxis of anaphylactic shock was carried out by preliminary injection of the neurolytic mixture by the intramuscular method 45-60 minutes and by the intravenous method 5 to 10 minutes before the reacting dose of the antigen.

In the control series of experiments (without the prophylaxis of anaphylactic reactions) the intravenous injection of the reacting dose of the antigen (natural steer serum, therapeutic Belen'kiy serum, aminopeptide-2) was always accompanied by the development of anaphylactic shock of different degrees of severity. The blood pressure at the time of administration of the antigen and immediately after it rose by 10-15 millimeters; after one or two minutes a reduction in blood pressure occurred at first to the original level and then, in the next three or four minutes, it fell critically to zero.

Usually, anaphylactic shock was expressed clinically two or three minutes after the injection of the antigen. In a number of experiments the period of false well-being lasted for half-minute to one minute after which a marked motor excitation appeared, the spasms acquired the character of clonic-tonic convulsions, defecation and urination occurred. As a rule, in the experimental animals of the control group severe anaphylactic shock with a fatal outcome in the three to five minutes after injection of the antigen always developed in the experimental animal of the control group in response to the intravenous injection of the reacting dose of the antigen (steer serum).

Table 1

Name of experimental series	Intramuscular injection of "cocktail" 45-60 minutes before the experiment	I. V. injection of "cocktail 5-10 minutes before experiment	Preliminary injection of thorazine and pentamine	Use of "cocktail" at time of anaphylactic shock	Used as reacting dose of antigen					Outcome	
					Steer serum	LSB	Amino-peptide	L-103	Amino-krovin	Lived	Died
Control group					5/5	5/3	5/1	5/1	5/2	13	12
Prophylaxis of anaphylactic shock with "lytic coctail".....	20/1	20/2	5/2		5	5	5	5	5	65	5
Prophylaxis of anaphylactic shock with "lytic coctail" using reacting dose of antigen.....	10/10		10/10		20/20					-	20
Treatment of anaphylactic shock with "lytic cocktail".....				10/10						-	10
Total.....	30/11	30/12	5/2	10/10	30/25	10/3	10/1	10/1	10/2	78	47

Note. In the numerator the number of animals used in the experiment is shown; in the denominator, the number of animals which died as the result of the experiment.

The use of an antigen of protein blood-substitutes (aminopeptide-2) as the reacting injection led to the development of a distinctly expressed picture of anaphylactic shock; in a number of cases this also occurred with a fatal outcome (in six out of 20 experiments, see Fig. 1). The subcutaneous sensitization of experimental animals with steer serum with the subsequent intravenous injection of aminopeptide-2 as the reacting injection or, on the other hand, the use of the antigen (steer serum) as a reacting dose 7 to 10 days after the subcutaneous injection of therapeutic Belen'kiy serum or aminopeptide-2 was accompanied by the development of anaphylactic shock, sometimes with a fatal outcome.

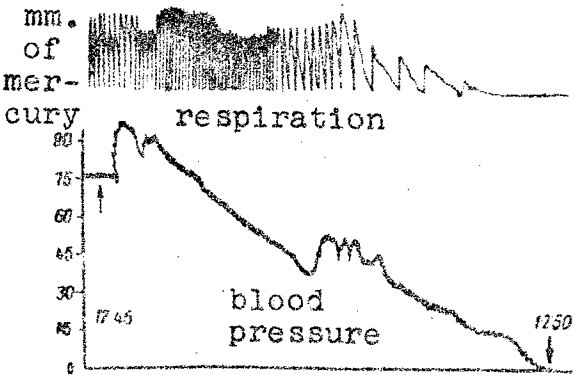


Fig. 1. Anaphylactic Shock in a Rabbit.
5:45 pm. -- injection of aminopeptide; 5:50 p.m. -- death of the rabbit.

Intravenous injection of a neurolytic mixture at the time of the pronounced picture of anaphylactic shock, at which time the blood pressure had dropped by more than half of the original level and when deep-seated changes had occurred in the respiration (marked increase in frequency, sometimes with brief cessation of respiration), did not lead to the elimination of anaphylactic shock. In almost all the rabbits the injection of the mixture was accompanied by a further, even more rapid reduction in the blood pressure and death of the animal. The intravenous injection of neurolytic mixture along with the reacting dose of the antigen caused the development of a typical picture of anaphylactic shock and death of the experimental animals at the same time as in the control group: sometimes, death of the animal occurred without any motor excitation or preliminary rise in the blood pressure (Fig. 2).

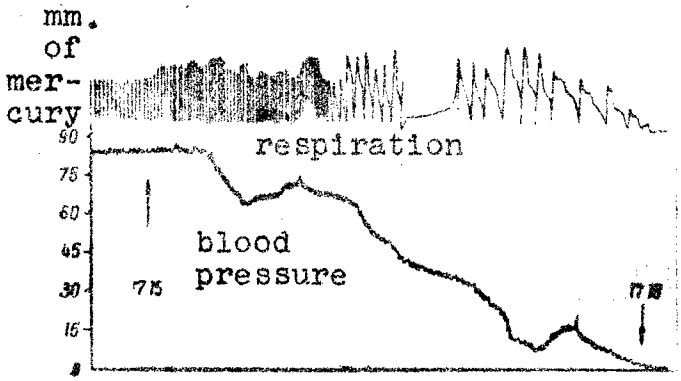


Fig. 2. Change in Blood Pressure and Respiration in Response to Injection of Reacting Dose of Antigen Mixed with Neurolytic Mixture.

5:15 p.m. -- time of injection; 5:18 -- death of the animal.

The intramuscular injection of the neurolytic mixture after 15-20 minutes led to a gradual reduction in blood pressure by 10-15 millimeters from the original level. Beginning with this time, the respiration became slower and more superficial. Unsteadiness of the gait, weakness developed, and the "head droop" sign appeared, and the extremities slid out to the sides. At the time of injection of the reacting dose of the antigen (45-60 minutes after the "cocktail") the experimental animals were in a drowsy state; the sign of slipping of the extremities out to the sides had become distinct, the respiration had become superficial, no more than 20-28 respirations a minute. Intramuscular injection of the neurolytic mixture 45-60 minutes before the reacting dose of the antigen prevented the development of the full picture of anaphylactic shock and death of the experimental animals, although the injection of the antigen was accompanied by a slight motor reaction, drop in the blood pressure, and increase in the respiratory frequency. Usually, 10-15 minutes after the intravenous injection of the antigen a blood pressure rise began, but it never came up to the original level at the end of the experiment, and always was 15-20 millimeters below the original level (before the use of the neurolytic mixture). In the one or two hours following the experiment the rabbits were in a drowsy state; after three or four hours they began to move about actively, took food and water. On subsequent days the behavior of the rabbits was normal (Fig. 3).

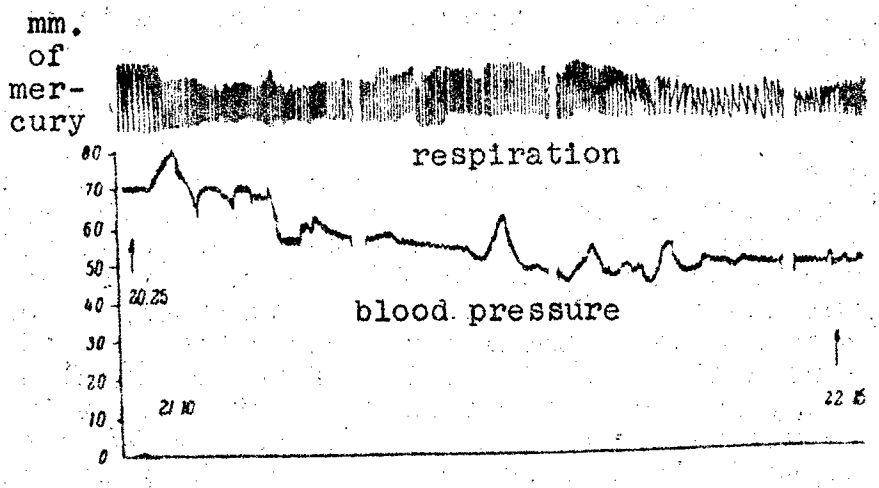


Fig. 3. Prophylaxis of Anaphylactic Shock by Preliminary Injection of the Neurolytic "Cocktail" Intramuscularly.

5:25 p.m. -- intramuscular injection of the "cocktail"; 6:10 -- injection of the reacting dose of antigen; 7:15 -- end of the experiment.

As a rule, the intravenous injection of the "lytic coctail" led to the decrease in the blood pressure by 30-40 millimeters. At first, the respiration increased in frequency, the amplitude of the respiratory movements almost doubled, and then after three-five minutes a superficial slow respiration occurred (10-12 minute).

The sequence of intravenous injection of the various ingredients of the mixture under experimental conditions is of a certain importance. The rabbits are very sensitive to the intravenous injection of a solution of dimedrol. Usually, the dose of 0.5-1.0 cubic centimeters of two-percent dimedrol solution produced a marked motor excitation, labored respiration, and, if artificial respiration was not begun at this time the rabbits died. This circumstance caused us to inject thorazine, pentamine, promedole solutions first and then, after one or two minutes, to give an injection of the dimedrol solution. In these cases, the injection of dimedrol was not associated with any motor reaction or with the death of the animal.

A very rapid injection of the cocktail intravenously led to a marked reduction in the blood pressure down to 20 millimeters, and in two cases the blood pressure dropped to zero, the cardiac activity stopped, the respiration ceased, and the experimental animals died. Slow intraven-

ous injection of these preparations (three cubic centimeters in five to seven minutes) was not associated with any rapid drop in blood pressure, although the drop in it did occur every time and lasted no less than two hours after the injection of the "cocktail"; at this time, various brief pressure rises were observed by 10-15 millimeters. Subsequent intravenous injection of the reacting dose of antigen 5 to 10 minutes after the "cocktail" did not give rise to anaphylactic shock or death of the experimental animals in these cases. In a considerable portion of the experiments no preliminary rise of the blood pressure occurred after the injection of the reacting dose of the antigen, as had occurred in the control experiments, but there was rather a reduction in the blood pressure, sometimes to 20-15 millimeters, with a subsequent rise to 60-70 millimeters at the end of the experiment. In the first few days after the experiment all the rabbits which had had an intravenous injection of the reacting dose of the antigen after a preliminary injection of the "lytic cocktail" remained alive.

Clinical observations. In the hospital patients are given infusions of the enzymatic heterogenous protein blood-substitute hydrolysate aminopeptide-2 with the aim of preparation for operative procedures, during the postoperative period as well as with the aim of parenteral nutrition along with the transfusion of blood.

The number of patients with different diseases and the number of single and repeated infusions of aminopeptide-2 are presented in Table 2.

Table 2

Name of disease	No of patients	No of aminopeptide infusions			single dose of aminopeptide in cubic centimeters		
		1	2	3 or more	250	500	750 or more
Carcinoma of the esophagus...	17	10	4	3	9	8	-
Carcinoma of the stomach.....	16	6	4	6	8	8	-
Carcinoma of the lungs.....	1	-	1	-	1	-	-
Carcinoma of the rectum.....	1	1	-	-	1	-	-
Neoplasms of the brain.....	6	5	1	-	6	-	-
Gastric and duodenal ulcer...	6	2	1	3	2	3	1

Table 2 [continued]

Name of disease	No of patients	No of aminopeptide infusions			single dose of aminopeptide in cubic centimeters		
		1	2	3 or more	250	500	750 or more
Bronchiectasis.....	1	-	1	-	1	-	-
Lung abscess.....	4	2	1	1	3	1	-
Esophageal constriction on the basis of a chemical burn....	2	-	1	1	1	1	-
Trophic ulcer of the lower extremities.....	2	1	1	-	2	-	-
Fibromyoma of the uterus.....	1	1	-	-	1	-	-
Total.....	57	28	15	14	35	21	1

The transfusion was given with the observance of all rules provided for in "Instructions On the Use of Aminopeptide For Parenteral Nutrition." As a rule, in patients after thefirst intravenous injection of aminopeptide-2 the post-transfusions reactions did not appear, aside from one patient who could not even tolerate 50 cubic centimeters of the preparation, although the rate of injection was 15-20 drops a minute. This patient promptly developed chilly feelings, facial hyperemia, perspiration, difficulty in respiration, pains behind the sternum, and hives. Repeated attempts to continue the infusion of aminopeptide-2 following brief stoppages of it did not improve his condition, and the infusion of the preparation had to be stopped.

Repeated intravenous infusion of aminopeptide-2 10-14 days after the last infusion, particularly a subcutaneous one, was accompanied by a overt reaction of varying degrees of severity in three to four percent of the cases.

Patient T. was admitted to the hospital for carcinoma of the middle third of the esophagus. After examination it was decided to perform an operation -- the creation of an artificial esophagus from the large intestine using the pre-sternal method as the first stage of a two-stage operation for the removal of the carcinoma-afflicted esophagus.

With the aim of preparation for operation and for

the purpose of parenteral nutrition 250 cubic centimeters of aminopeptide-2 series 46 was given by intravenous drip at a rate of 30 drops a minute. The patient took the infusion well. After seven days aminopeptide-2 series 63 was administered again at an initial rate of 30-35 drops a minute. After 10 minutes facial hyperemia appeared, a feeling of heat, retrosternal pain, difficult respiration, and a rash of the urticaria type throughout the body. The pulse increased in frequency from 64 to 100 beats a minute; the respiration also increased in frequency (29 a minute); the infusion of aminopeptide-2 was stopped. The chill decreased somewhat, and the retrosternal pains stopped.

After 25 minutes the infusion of aminopeptide-2 was continued at the previous rate. The symptoms mentioned above increased in intensity, and the lumbar pains were added. The pulse was rapid and within limits of 110-120 a minute; the respiration was 36 a minute, superficial; puffiness of the face appeared. The infusion of aminopeptide-2 was again stopped. The "lytic coctail" was promptly injected intramuscularly: thorazine two percent, two cubic centimeters; promedol two percent, two cubic centimeters; dimedrol two percent, two cubic centimeters; vitamin B_1 five percent, one cubic centimeter. The pulse was 90 beats a minute, rhythmical, of satisfactory quality; the pains in the lumber area stopped, and the chill decreased; the patient began to note a dryness in the mouth and a feeling of numbness of the tongue. Further infusion of the aminopeptide-2 was begun at the same rate. After 15 minutes, the patient became drowsy, did not complain of pain, the pulse was 88, the respiration 24 a minute, and the rash disappeared. The rate of administration of the aminopeptide-2 was increased to 70-90 drops a minute. The infusion of the preparation was completed. The pulse was 76 a minute, the respiration 22, the patient was drowsy and did not offer any complaints. The temperature was 37°.

After the infusion of aminopeptide-2 certain patients complained of headaches, a feeling of weight in the head, which disappeared after three or four hours.

In the literature there are reports to the effect that the infusion of protein heterogenous blood-substitutes is accompanied by a decrease in the blood coagulability (D. A. Arapov and K. S. Simonyan). In our observations the infusions of aminopeptide-2 was also accompanied by an increase in the coagulation time of the blood by 1-1.5 minutes, although the bleeding time did not undergo any notable changes. In individual cases the bleeding time also increased, and the quantity of prothrombin increased somewhat in comparison with the original figure. After three-five

days the coagulation time and the bleeding time came back to previous figures. If the infusion of aminopeptide-2 was given along with the transfusion of blood of the same group, the bleeding time and coagulation time of the blood directly after the transfusion were reduced (one minute and 40 seconds instead of two minutes and 20 seconds).

With the aim of prophylaxis and treatment of post-transfusion reactions the "lytic coctail" was used intramuscularly for blood transfusion in certain patients 45 minutes before the transfusion of blood and at the time of the transfusion when reactions had already developed.

According to our observations, a preliminary intramuscular injection of the "lytic coctail" 45 minutes before the transfusion of preserved blood and heterogenous protein preparations or even after a reaction had occurred most effectively prevents the occurrence of post-transfusions reactions or mitigates their course and outcome. The injection of a neurolytic mixture makes it possible not only to reduce the severity of the reactions which occur but also to continue the transfusion of protein heterogeneous preparations at the same rate as before, and sometimes even at a faster rate.

Conclusions

1. Under experimental conditions the intravenous injection of a neurolytic mixture along with a reacting dose of antigen does not prevent the development of anaphylactic shock or death of the experimental animals from it. Intramuscular injection of a neurolytic mixture 45-60 minutes and intravenous injection of it 5-10 minutes before the application of the reacting dose of antigen, as a rule, prevents the development of anaphylactic shock and death of the animals.

2. Under hospital conditions the preliminary intramuscular injection of the neurolytic mixture for blood transfusion and transfusion of heterogeneous protein preparations prevents the development of post-transfusion reactions; the rate of administration of these solutions under the influence of the neurolytic mixture can be increased to 120-160 drops a minute, that is, almost to the point of a stream transfusion of protein blood-substitutes.

3. When a post-transfusion reaction has occurred from the infusion of protein blood-substitutes or blood transfusion the use of the neurolytic mixture leads to the eradication of this reaction.

The Efficacy of Neuroplegic Mixtures in the Treatment of Traumatic Shock

(Experimental Investigations)

G. V. Tumanov, Lieutenant Colonel of the Medical Service

The results of utilization of neuroplegic agents in the treatment of shock are contradictory. Neuroplegic agents can produce complications in addition to the beneficial results, because they by far do not completely suppress the thermoregulatory mechanism and do not reduce the oxygen requirements, and they impoverish the conditions by which it is delivered to the tissues (Ye. V. Gubler). The harmful effect of neuroplegic mixtures, according to the data of I. R. Petrov's laboratory, is manifested particularly distinctly during the cooling of animals. The aim of the present work was the checking of the efficacy of neuroplegic mixtures in the treatment of traumatic shock under conditions of heating of the animals.

Experiments were performed on rabbits weighing two to three kilograms. Trauma was inflicted with a wooden mallet in the soft tissues of the thigh until the blood pressure dropped by 50-40 percent with respect to the original level. The blood pressure, pulse and respiration were recorded before the trauma, directly after the trauma and 20 minutes after it, and every subsequent hour for three to four hours. The blood pressure was recorded from the carotid artery by a mercurial manometer on an electrokymographic strip; the respiration, by means of a cuff and a Marey capsule. The temperature (rectal) was taken before the fixation of the animal, after fixation, before trauma, directly after it, and subsequently every hour until the death of the animal.

An hour after inflicting the trauma, which brought about the development of the torpid phase of traumatic shock, neuroplegics were injected, and the heating of the animal was started simultaneously. The rabbits were heated by means of a fabric electric heater in which the trunk and hind extremities of the animal were wrapped. The degree of heating was regulated by switching the heater to the necessary routine of operation (I, II, III), and it was controlled by the reading of the rectal temperature.

The first neuroplegic mixture, which we arbitrarily called therapeutic combination No 1, consisted of the following (calculating per kilogram of body weight of the animal): hexamethonium -- one milligram, dimedrol [benadryl] -- five milligrams, atropin -- 0.000017 milligrams, dolan-

tin [demerol] -- five milligrams, novocain 0.25 percent -- 0.5 cubic centimeter. The second neuroplegic mixture, designated as therapeutic combination No 2, differed from the first only in the fact that instead of hexamethonium it included megaphene (calculating 0.125 millogram per kilogram of weight of the animal). The therapeutic mixtures were injected intramuscularly (in a single syringe); the novocain was injected intravenously (into the auricular vein). In all the experiments the therapeutic combinations were used once. After injecting the neuroplegic mixtures the blood pressure, the pulse, respiration and temperature were recorded; at first every five minutes, and later, every 10 minutes until the end of the experiment.

In the control series of experiments (10 animals) we posed ourselves the problem of finding the magnitude of mechanical trauma which causes the development of the torpid phase of traumatic shock. Control experiments showed that severe mechanical trauma (65, 90 blows) under the conditions of a drop in blood pressure to 50-40 percent of the original level, and maintenance of it at this level causes the development of the torpid phase of traumatic shock in no less than 20 minutes and leads to severe disturbances in the hemodynamics, pulse, respiration, temperature and death of the animals (8 out of 10 rabbits died).

In the next two series of experiments an attempt was made to bring the animals out of the state of shock, for which purpose the neuroplegic mixtures presented above were tried out with simultaneous heating of the animals. In using these therapeutic combinations we had the aim of affecting various links of the neuro-humoral regulation and, by the same token, reducing as much as possible the reflex reactions to trauma, decreasing the metabolism and maintaining the reserve forces and compensatory capacities of the organism. These substances, which possess ganglion-blocking, spasmolytic and antihistaminic effects, when used in small doses caused a definite, although slight, inhibition of the central and peripheral nervous systems.

The use of therapeutic combinations Nos 1 and 2 with simultaneous heating of the animals made it possible to bring the animals out of a state of severe traumatic shock in 7 out of 10 experiments in the first series and in 8 out of 10 in the second series. After injecting the neuroplegic mixtures and heating, the animals became calm, the muscles relaxed, the respiration was regular, and the blood pressure after its original drop remained at the same level for more than an hour and began to rise in a wave form only at the en of the second hour with the heating of the animal. At this time, the rabbits again became restless.

After being freed from their fixation (after three or four hours) many animals spontaneously turned around on the table and assumed their usual position, remaining lying with their extremities outstretched. The animals, which were put into a cage with food, began to eat after 10-50 minutes (which we never had observed in the control series of experiments); some of them thirstily drank water. After one or two hours the animals assumed a sitting position; some of them moved about the cage freely dragging their injured extremities. In all experiments their subsequent behavior was normal. The next day the animals apparently were not much different from normal. In this process those animals which had been given the therapeutic combination No 2 recovered from the trauma more rapidly.

The injection of neuroplegic mixtures with simultaneous heating of the animals caused a definite drop in blood pressure by 8 to 24 millimeters after five minutes in all experiments withthe use of therapeutic combination No 1, and by 18-22 millimeters with the injection of combination No 2. Subsequently, the blood pressure level either remained, on the average, at the level achieved at the end of the experiment or increased in a wave form.

After the injection of the neuroplegic mixtures the pulse somewhat increased in frequency; at the end of fixation in certain rabbits (five) it approached the original figures. Thirty minutes after the injection of the mixtures the respiration slowed up somewhat; with heating of the animals it gradually increased in frequency. The return of the body temperature to normal was accompanied by an increase in frequency of the pulse and respiration which exceeded their original levels. This increase in frequency was less pronounced with the use of therapeutic combination No 2. The most favorable course of shock was noted in those animals in which the rectal temperature was less than the original by one or two degrees.

The temperature, as in the control series of experiments, dropped to 31.1-32.7° by the end of the first hour after the trauma. After the injection of the neuroplegic mixtures, despite the fact that the animals had been heated, in part of the experiments a further drop in the temperature by 0.7-1.9° was observed (six experiments). Afterwards, with the heating of the animal the temperature slowly returned to its original level. After the heating was stopped during the first few hours a second drop in temperature to 34-35.5° was noted which gradually returned to normal in 10-12 hours after the use of therapeutic combination No 1 and in six to nine hours after the injection of combination No 2.

Therefore, the experimental data attest to the fact that the neuroplegic mixtures are reliable therapeutic agents in controlling traumatic shock. They exert a local and general effect, suppress the reflex reactions from the site of the trauma and protect the central nervous system against premature exhaustion. Thereby, hexamethonium, as follows from the reports in the literature, chiefly exerts a peripheral ganglion-blocking effect, and megaphene exerts a pronounced central effect. These preparations, particularly megaphene, possess also a sedative (local anesthetic), anticholinergic, central sympatholytic, antiinflammatory, antiemitic effect, anti-convulsive activity, and eliminate the motor reactions in animals as a result of the relaxation of the skeletal musculature. Both hexamethonium and megaphene possess a moderate hypothermic and a considerable vasoplegic effect, lowering the blood pressure.

The injection of the antihistamine preparation benadryl, the parasympatholytic agents atropin and dolantin [demerol], which possess sedative and antispastic effects, and the intravenous use of novocain in the therapeutic combination No 1 and No 2 in addition to hexamethonium and megaphene eliminate certain harmful aspects of the effect of ganglion-blocking agents alone (excessive drop in blood pressure, etc.), and with their combined use in small doses, under the conditions of simultaneous heating of the animal, exert a pronounced therapeutic effect in traumatic shock. In the treatment of traumatic shock both therapeutic combinations gave reliable results; however, combination No 2, in which megaphene was included, should be considered more efficacious. Neuroplegic mixtures may be recommended for tests clinically with the aim of treatment of traumatic shock.

Changes in the Type of Gastric Motor Activity in Patients with Chronic Gastritides and Peptic Ulcer

S. B. Korostovtsev, Major of the Medical Service,
Candidate of Medical Sciences

The problem of the constancy and the changes in the type of gastric motor activity assumes great practical importance in connection with the varied and broad study of it. Actually, if the type of gastric motor function in the same person changes considerably and for no reason in the course of several days, the study of it would not help much in the diagnosis of gastric diseases. In this case, it would also be impossible to judge the results of treatment or the effect of drugs in the changes of the gastric motor activity, because they would be of a chance character.

This problem has not been subjected to special analysis. With reference to this there are only isolated statements. The majority of research workers studying the gastric motor activity have indicated a considerable similarity of the gastrograms in repeated investigations, and only individual authors have not found such a similarity.

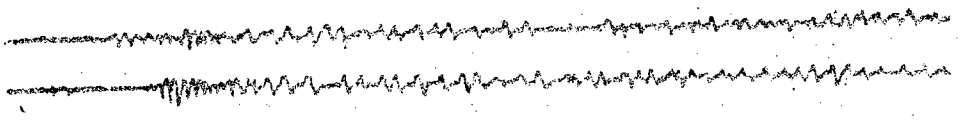
The aim of the present work consisted in studying the problem of the constancy of the type of gastric motor activity. In solving this problem, other rules and regulations were uncovered which to a certain degree throw light on certain characteristics of the clinical course of chronic gastritides and peptic ulcer.

The gastric motor activity was studied by the method of Bykov-Kurtsin. The gastrogram was recorded for an hour (tank containing 250.0 cubic centimeters of air). All the subjects -- healthy ones and those sick with chronic gastritides and peptic ulcer -- were 20-25 years of age. In evaluating the gastrograms according to the strength and rhythm of the waves and in determining the type of gastric motor activity by this means normal types of gastric motor activity were distinguished (first type -- calm; second type -- rhythmical, moderately excitable; third type -- rhythmical, "asthenic") and pathological types (fourth type -- arrhythmical; fifth type -- rhythmical, excitable).

The following examinations were made: a repeat examination after an interval of two to seven days in five persons; a repeat examination at the time of the second hospitalization in 14; a repeat examination after an interval of one to seven days before the administration of the drug being investigated in 84 (gastrogram recorded for 15 minutes); examination before and after treatment in 128 persons.

At the time of a repeat examination of five persons

after an interval of two to seven days it was shown that not only the type of gastric motor activity in all the subjects was constant but the number of waves, their height and even their shape and position as well as the gastric tone at the time of the first and second examinations were also identical. As an example we should like to present two gastrograms of a patient with chronic gastritis (see Figure). Three days passed between the recording of the first and the second curves. As is seen from the Figure, not only the same type of gastric motor activity was maintained (rhythmic, excitable or fifth type according to our classification); almost a complete identity of the gastrograms was found even with respect to details: the hill-like and peaked waves, the transition of the former to the latter at the end of the hour of recording, the transition of the peaked waves to a calm curve were similar. Both in the first and in the second examinations each peaked wave was accompanied by a pain seizure. Such a similarity of the gastric motor activity at the time of the first and the second examinations was noted in a patient with peptic ulcer (rhythmic, excitable type) and in three healthy persons (calm type in two persons and rhythmic, "asthenic" in one person).



Patient K., Age 22, Diagnosis -- Chronic Gastritis. The upper gastrogram was taken 7 February 1951; the lower one, 10 February 1951. The time intervals were five seconds. Reduced 10 times.

It is also important to note that if during the first hospitalization improvement in the patient's condition occurred under the influence of treatment and the pathological type of gastric motor activity changed over to one of the normal types at the time of the second hospitalization the direction of the changes in gastric motor activity under the influence of treatment was similar. Therefore, one definite type of gastric motor activity was characteristic of each patient in a state of exacerbation of chronic gastritis (particularly during the period under three to four months), and another type was characteristic of him in a state of remission. All this constitutes evidence, on the one hand, of a considerable stability of the type of gastric motor activity in a given condition of the patient, and, on the other hand, a relationship of the changes in the type with the course of the gastric disease.

One patient with chronic gastritis was hospitalized three times at intervals of 95 and 75 days. Each time on admission he showed a rarely encountered variant of an arrhythmic type (arrhythmic excitable or type 4b according to our classification). The rhythm, the strength of the waves and the nature of the gastrograms were the same, which follows from the identity of the types of gastric motor activity. The agreement was complete also with respect to the number of waves in an hour (30, 32 and 32) and in the magnitude of the gastric tone (25, 22 and 24 centimeters of water).

In evaluating the results of the observation it may be stated that during the course of a definite period of time, which frequently amounted to many weeks, the human gastric motor activity has a definite nature ("its own handwriting"), which changes either under the influence of various therapeutic influences or with the development or exacerbation of the disease or with the lapse of time.

In the study of the effect of drugs usually two examinations were made at the time of admission with an interval of one to seven days between them, and then a third examination was made at the end of treatment. The first examination served as the background for all subsequent comparisons. During the second examination the substance being tested was introduced intravenously or into the stomach tube at the 15th minute so that it might be possible to compare the data of the gastrogram taken during the 15 minutes with a similar section of a gastrogram in the first examination. Such a comparison was necessary for the purpose of evaluating the effect of the substance being examined in the experiment. Undoubtedly, the 15-minute interval is sufficient for a complete comparison. Where the recording of the gastrogram for an hour can definitely show the identity or difference between the gastric motor activity in the two examinations, a 15-minute recording of the gastrogram does not give such a definite result. Nevertheless, a comparison in 84 patients confirmed the fact of the relative stability of the gastric motor function in patients with chronic gastritides and peptic ulcer. The initial 15-minute section of the gastrogram proved to be the same in the first and second examinations in 58 out of 84 persons, that is, in 69 percent.

The data concerning the changes in the gastric motor activity which occur under the influence of treatment show a close connection existing between the dynamics of the pain syndrome and the dynamics of the type of gastric motor activity. By the same token, these data also contribute to solving the problem of the constancy of the type of gastric motor activity.

Patients with chronic gastritides and peptic ulcers were examined at the time of admission, as has already been

described above, and after three or four weeks, that is, after the first course of treatment (diet No 1, novocain by mouth or intravenously in ordinary dosages, promedole, diphacyl [diphenylacetic acid, diethylaminoethyl ester: choline-antagonist], alkalis, vitamins, etc.), in the majority of patients an improvement in their condition occurred as early as after the first course of treatment; the pain syndrome disappeared or lessened considerably, etc. These changes constituted the group "with improvement." In another portion of the persons no such improvement occurred at the end of the first course of treatment; these patients constituted the group "no change." We considered the examination data only of those patients in whom pathologic types of gastric motor activity -- arrhythmic (fourth type) and rhythmic, excitable (fifth type) -- had been found before treatment. There were 128 such persons. Of them 72 persons were in the "improvement" group, and 56, in the "no change" group.

The results of treatment and the change in the type of gastric motor activity in the patients with chronic gastritides and peptic ulcers in whom pathological types of gastric motor activity had been shown before treatment were the following. In patients in whom the pain syndrome disappeared and in whom the general condition improved after treatment the pathological types of gastric motor activity were not found in the majority of the cases (80.6 percent), and the gastrogram became normal. A completely different picture was observed in the group where the pain syndrome was maintained. In this group, pathological types of gastric motor activity (fourth or fifth type) were maintained in the majority of patients (87.5 percent), whereby the same type of gastric motor activity as existed prior to treatment was noted in almost 70 percent of all the persons examined.

Therefore, the considerable improvement in the general condition with a disappearance of the pain syndrome in gastric patients coincides usually with a transition of the pathological type of gastric motor activity to a normal type. If the pain syndrome in these patients is maintained, the type of gastric motor activity is also maintained. The latter circumstance attests to the fact that in this condition of the body the gastric motor activity maintains a constant character. The maintenance of the pain syndrome evidently is also an expression of the maintenance of definite disturbances in gastric motor activity, which confirms conclusions to the effect that the gastrogram can serve as an objective index of the pain syndrome. In evaluating the results of the investigations as a whole, it is permissible to say that the gastrogram may also be one of the objective criteria of the efficacy of treatment of patients with chronic gastritides and peptic ulcers.

Experience of Gastroscopy in Gastric Ulcer

A. L. Khazanov, Lieutenant Colonel of the Medical Service,
Candidate of Medical Sciences
Z. A. Gazova

We performed gastroscopies in 172 patients (162 men and 10 women) suffering from peptic ulcer with a localization of the ulcer in the stomach. The investigation was carried out according to the method of N. S. Smirnov with certain changes introduced by Isayev and other authors, chiefly with gastroscopes of the old design -- the Wolff-Schindler type and the first model of the "Krasnogvardeyets" plant. In all, 279 gastroscopies were performed: 97 patients were examined once; 75, two or more times. In eight patients a tumor of the stomach had been diagnosed according to the data of the X-ray examination and gastroscopy. However, at the time of resection of the stomach it was shown that the involvement was of an ulcerative nature, whereby in four patients there was a callous ulcer and in one a callous ulcer with elements of degeneration. Gastroscopy was performed in eleven patients with the aim of confirming cicatrization of the ulcer. In a considerable group of those examined (in 62 out of 153) the data of the X-ray and gastroscopic examination agreed: an ulcer was found by both methods. In 46 patients the ulcer was detected only roentgenologically. In this group the frequency of pyloric (prepyloric) ulcers attracts attention. In 11 of the 13 patients it was impossible to detect the ulcers in such a location gastroscopically. This indicates the relative diagnostic value of gastroscopy in pyloric ulcers. A certain part of the ulcers of the lesser curvature were located on the posterior wall next to the lesser curvature; these ulcers, in the middle third, were also frequently inaccessible to gastroscopic examination, because they were located too near the objective lens.

In 42 patients the ulcer was found only gastroscopically, and the X-ray data were negative. These results of the examination emphasize the need for gastroscopy in all patients in whom a gastric ulcer is suspected. In 18 patients the ulcer was first found during gastroscopy, although according to the data of the history the disease had lasted from one to eight years. Prior to gastroscopy from one to seven roentgenologic examinations of the stomach had been made with a negative result. Among them there were gastric hemorrhages in the past in three the origin of which had remained unclear prior to gastroscopy. Of the 24 persons an ulcer had been found roentgenologically in the past, in the stomach in 16 and in the duodenum in 8. During an exacerbation of the

disease, data which preceded gastroscopy did not confirm the diagnosis. After detecting the ulcer gastroscopically, the X-ray examination was repeated. Thereby, one ulcer was found in only 27 patients.

Patient L., born in 1909. He was admitted to the hospital 25 January 1954 with complaints of constant dull pains in the right subcostal area which increased 40-60 minutes after eating, and general weakness. The pains in the right subcostal area had appeared in the autumn of 1952 and then had begun to be repeated frequently with a certain increase during the spring and fall. From time to time the pains were of a paroxysmal nature. Chronic cholecystitis was diagnosed, and for 1 1/2 years the patient was treated three times in hospitals and once in the sanatorium at Essentuky. However, his condition worsened, and the pains increased; beginning with the end of 1953 vomiting of food was sometimes observed at the height of the pains, which brought relief. Before admission to our hospital the patient had had an X-ray examination of the stomach six times with a negative result.

On objective examination the following were found: the patient showed some loss of weight; there were no changes in the heart and lungs; the liver projected one centimeter below the costal margin; there was tenderness and a slight rigidity of the muscles along the right border of the rectus abdominis muscle four to six centimeters below the costal margin.

Blood analysis: hemoglobin -- 70 percent; red blood count -- 4,300,000; white blood count -- 7600; sedimentation rate -- 30 millimeters in an hour. Analysis of the gastric contents: total acidity -- 12; free acid -- 0. Analysis of the duodenal contents: there were solitary leukocytes in the ABC portions. On roentgenoscopy of the stomach only an insignificant thickening of the mucosal folds was noted.

The patient was treated for a suspected disease of the gallbladder. However, his condition did not improve.

On 3 March a gastroscopy was performed: the mucous membrane was hyperemic everywhere, and in the lower third of the lesser curvature and in the distal portion it had a reddish-purple color. Several submucous hemorrhages were seen on the greater curvature and posterior wall. The lesser curvature in the area of the angulus and the antral ring were deformed. The right hemisphere first formed a deep recess, and then at the boundary of the posterior wall and lesser curvature there was a swelling which did not smooth out with air insufflation. At the bottom of the recess there was quite a large but superficial elongated ulcer about two centimeters in length with a necrotic dark-grey coating on the bottom. The right wall of the ulcer was continuous with the swelling. Peristalsis was present in the antral portion.

Conclusion: large gastric ulcer with definite infiltrative changes around it.

In connection with the fact that the problem of operation was posed, X-ray examination of the stomach was performed on the patient three times more, and only one of these times was an ulceration of the mucosa found in the area of the angulus. On 10 May a gastric resection was performed. Degeneration of the gastric ulcer into carcinoma with metastases to the lymph nodes was established by histologic examination.

Therefore, the patient had suffered with peptic ulcer for 1 1/2 years. At the margins of the indolent ulcer there were elements of degeneration. Despite the great size of the ulcer, it was not found after seven X-ray examinations in medical installations.

According to our observations, an ulcer of the lesser curvature in the area of the angulus of the stomach which is very little displaced toward the anterior or posterior wall is quite often not found on X-ray examination. Of 23 ulcers of the lesser curvature found on gastroscopy alone, 19 were located in the places mentioned. Ulcers in the area of the angulus of the stomach are apparently encountered more often than is customarily believed (Yu. M. Lazovskiy and others). Hoffman mentions that of the 256 patients with gastric ulcers studied by him, 131 had ulcers in the area of the angulus of the stomach. These data emphasize the need for gastroscopy in patients suspected of gastric ulcer, because the area of the angulus is best accessible to a good examination by gastroscopy.

In three patients, neither X-ray nor gastroscopic examinations detected the ulcers which they had. In one of them, a month after discharge from the hospital a perforation of an ulcer of the pyloric area occurred; in another, a callous ulcer of the lesser curvature was found after two months. In a third, despite the negative X-ray and gastroscopic data, characteristic clinical signs indicated peptic ulcer. The patient agreed to a suggested gastric resection, during which an ulcer of the lesser curvature of the stomach was found which had been suggested clinically. In these three patients only submucosal hemorrhages had been found by gastroscopy, and in two, erosions of the mucosa. Of all the patients whom we examined, erosions were observed in 28 persons and submucosal hemorrhages in 46. Erosions and submucosal hemorrhages usually are evidence of activity of an ulcer process. In the three patients mentioned above we definitely underestimated this important feature.

Therefore, the negative results of even a comprehensive examination -- X-ray and gastroscopic -- does not completely eliminate the possibility of the existence of a gastric ulcer.

We have mentioned above that in eight patients a diagnosis of gastric tumor had been made after gastroscopy; however, on histologic examination of the resected portions of the stomach ulcers were found, and of these there was only one which had elements of degeneration. According to gastroscopic data, a tentative diagnosis of tumor or degenerating ulcer of the stomach was made in 24 patients. The operative data and subsequent observations of these patients showed that in eight of them there was an ulcer; in nine, a callous ulcer; in seven, a degenerating ulcer. This emphasizes the inadequate reliability of gastroscopic signs of degeneration of an ulcer. Usually, mention is made of the following gastroscopic signs of a transition of an ulcer into carcinoma: indistinctness of the ulcer margins; localized verrucous proliferations in the vicinity of the ulcer; a whitish, anemic rim of the surrounding mucosa; projection of tumor-like proliferations into the lumen of the ulcer defect; large size of the ulcer. The majority of these signs is of relative importance. Apparently, only one of the signs listed above is reliable, namely, verrucous proliferations around the ulcer resembling small papillomata. We observed such proliferations in three patients, and the histological examination confirmed a carcinomatous degeneration. However, we found papillomatous type proliferations in less than half of the patients with degenerated ulcers.

Despite the relative diagnostic value of all gastroscopic signs of ulcer degeneration, the existence of at least one of them should always be an indication for operative intervention.

Certain Comments for the Improvement of the Functional Qualities of the ADP and DDA-53

G. T. Saakov, Lieutenant Colonel of the Medical Service

For the purpose of sanitary processing of the troop personnel, disinfection and insect elimination of the uniforms, the disinfection-shower apparatus -- DDA-53 and the motorized steam-elevator apparatus -- ADP are used most often. Fundamentally, these apparatuses work well, are simple to use and possess an entirely satisfactory handling capacity. However, the DDA-53 and the ADP also have essential defects, which, in our opinion, limit their tactical possibilities.

The DDA-53 and the ADP, mounted on the chassis of a GAZ-63 [truck], are inadequately resistant to glazed frost. The control and measuring devices of the apparatus (manometer, water gage and thermometers) are not lighted; they have short hoses for collecting cold water. The cold water supply system (sucking hose, the "BKF-2" pump and the pipe-line) are not heated. The flexible pipes are made of rubber-fabric, are smooth (steam pipes), short and unwieldy and occupy considerable space and are heavy.

During the course of many years work on the ADP and DDA-53 at various times of the year and various times of the day and under different terrain conditions, we have as much as possible attempted to eliminate their defects.

During the summer, the ADP and the disinfection-shower apparatus work well. We decided to test their operation under conditions of the cold part of the year. The cross-country ability of the DDA-53 on a GAZ-63 chassis on poor roads and on roads which have not been cleaned of snow is good, but their stability is unsatisfactory. The poor stability is explained by the fact that the center of gravity of the apparatus is too high. This defect can be eliminated if the center of gravity is made 15-20 centimeters lower. (The poor stability of the DDA-53 apparatus on a GAZ-63 truck chassis is incorrectly explained by the author as one of the defects in the apparatus. This is a defect in the truck, which at the present time is being modernized, and the height of the loading platform and, therefore, also the center of gravity are being lowered. -- The Editors.)

The work of the boiler, disinfection chambers and auxiliary equipment has been repeatedly checked at exercises where the temperature of the outside air was -12-15° and the wind velocity was 7-10 meters/second. The boiler operated without stopping. The manometer of the boiler sometimes did not indicate the steam pressure in view of the fact that steam condensed rapidly in the U-shaped tube of the manometer,

the condensate froze, the U-shaped tube was clogged and did not permit the steam to pass to the manometer.

Serious defects were found in the auxiliary equipment. Water in the cold water supply system froze again 15-20 minutes after heating. This created considerable inconveniences in the operation and threatened damage to the boiler. At first, the cold water supply system was heated with steam which was taken by a rubber hose from the main "steam outlet to the atmosphere," but this process had to be stopped also, because after the third or fourth heating the pipes, valves, pump and hose were covered with ice. Then, it was decided to heat the pipes, valves, and "BKF-2" pump with a blow-torch. This method did not satisfy us either.

For the purpose of preventing freezing of the pipes, valves and "BKF-2" pump, sucking hose and other units, we began to carry out the following measures.

The U-shaped manometer tube, the pipes connecting the "BKF-2" pump with the water-heater and boiler were heated with insulating material (asbestos, glass wool, rags, etc.). (The author's suggestion of using insulation on the manometer tube and on the pipes connecting the hand pump with the water-heater and boiler does not give the requisite effect, as tests have shown, in view of the fact that the water temperature in the wintertime is very low, +1-2°; in addition, any insulation on the mobile apparatuses is rapidly destroyed when they move. -- Editors.) In order to keep the "BKF-2" pump and sucking hose from freezing, steam from the main steam pipe (Fig. 1) was hooked up to point B. A 1/2-inch pipe with a steam valve was soldered onto the main steam pipe 5-10 centimeters above the level of the furnace doors, and its other end was connected to the pipe for connection to the sucking hose, 5-10 centimeters below the "BKF-2" pump. Where necessary, the valve may be opened, and steam from the main steam pipe heats the pump and the sucking hose.

Taking into consideration the fact that the apparatus cannot always travel to a source of water, particularly in the wintertime or because of the muddiness of the shores of the water source and the fact that the existing sucking hoses are short (8-12 meters), we lengthen the sucking hoses to 30-40 meters each. For the purpose of lighting the control-measuring instruments (manometers, thermometers, water gage and control spigots) for work in the dark, lights (automobile lights) were set up with reflectors on the manometer, water gage case, thermometers of the disinfection chambers and on the case of the thermometer used for measuring the hot water temperature fed to the shower units (see Fig. 1). The power for the electric light bulbs was given by the electrical system of the truck. In working under low temperature

conditions, steam quickly condenses in the steam pipes which lead to the formalin sprayers, and the condensate freezes; this creates inconvenience in the operation. In addition, articles lying close to the sprayer are, as a rule, sprayed with formaldehyde. The adaptation which we developed for introducing formalin into the lower part of the chamber through perforated pipes along which the steam is fed to the chamber eliminates these defects.

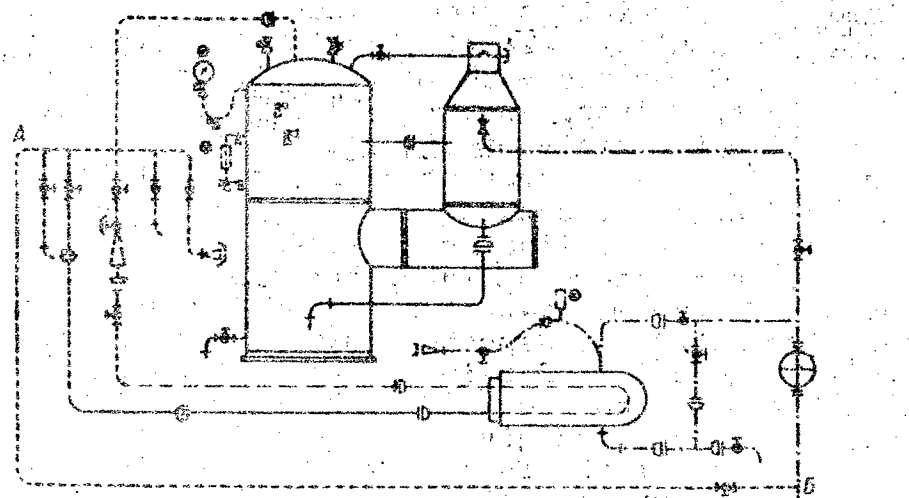


Fig. 1

After each valve which allows steam to pass into the chamber an ejector is welded (Fig. 2), and to it a vat G for formalin with a spigot B is attached. When the work is performed by the steam-formalin method, the necessary quantity of formalin is poured into the vat G. First, the valve permitting steam into the chamber is opened up, the steam passes through the ejector and the perforated pipes and is admitted to the chamber. The temperature in the chamber is raised to the necessary level. At this time, the spigot B is opened, and the formalin enters the chamber through the ejector and the openings in the perforated pipes. Afterwards, the entire work in the chamber is conducted according to established rules. The pipes along which the steam is fed to the sprayers and the sprayers themselves are removed, and the openings formed are stopped up.

We replaced the heavy rubber-fabric hoses in the apparatus with fire hoses. (As experience has shown, these hoses are not very strong and rapidly go out of commission.

The Editors.) The length of them was increased from 5 to 10 meters and from 10 to 15 meters.

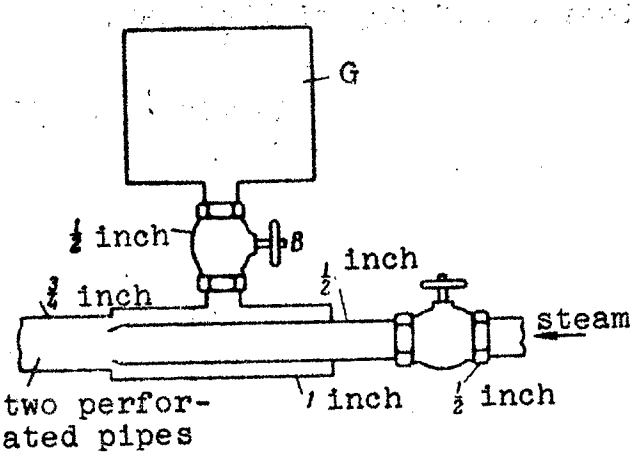


Fig. 2

In addition to their usual purpose we decided to use the ADP and DDA-53 also for deactivation of an ambulance which brought afflicted persons to a hospital. For this purpose a reducing pipe (Fig. 3) was constructed which was hooked up to the pipe for feeding water to the shower units from the boiler. A hose was hooked up to one connecting nut leading to the shower units, and a fire hose with a pump with a five-millimeter outlet was hooked up to the second. This small arrangement made it possible to wash people and deactivate the ambulance at the same time.

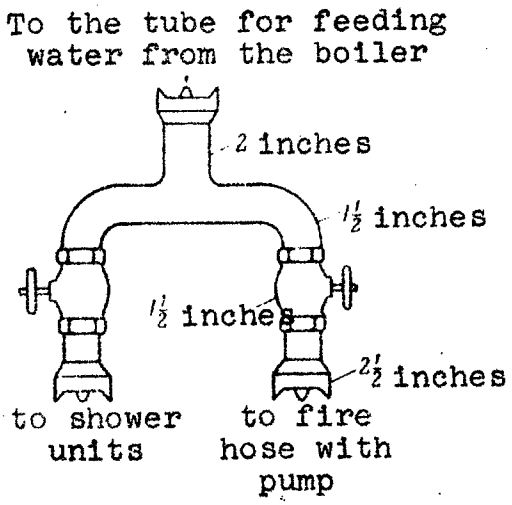


Fig. 3

After introducing these additions and changes, the

functional characteristics of the ADP and DDA-53 apparatus were improved. These apparatuses may be used under any climatic conditions and at any time of day.

Received May 1957

Portable Thermostat

I. M. Vilyanski, Lieutenant Colonel of the Medical Service,
Candidate of Medical Sciences
V. F. Pavlov

We are suggesting a portable thermostat for the purpose of transporting samples of duodenal contents and feces in the laboratory and for preventing the death of the protozoans from the effect of unfavorable temperatures, particularly in the winter time.

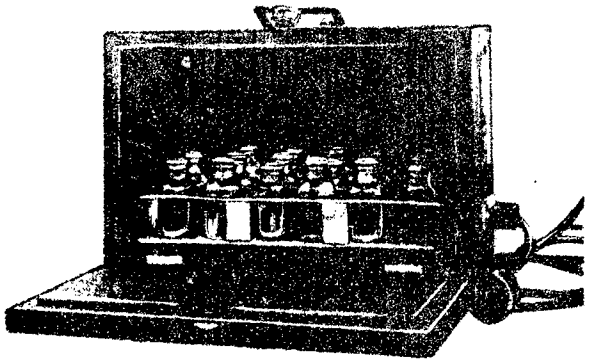


Fig. 1. Inside a Portable Thermostat.

The thermostat consists of a wooden suitcase; its internal dimensions are 260 x 150 x 130 millimeters. The wall of the suitcase is a double one; the distance between the walls (10-12 millimeters) is filled with asbestos fiber or glass wool for better insulation. Inside and outside the trunk is lined with lederin (granitol). Calico or leatherette may be used for the lining. The back inside wall of the box is made of aluminum 0.5-0.8 millimeter in thickness; behind this wall there is a heating apparatus -- an electric stove using 220 volts. An additional lead-out is made in the middle part of the stove heating coil for the purpose of hooking it up to a system using voltage of 127 volts. With the aim of maintaining a constant temperature of 36-37°, a bimetallic heat regulator has been placed inside the trunk (we used a heat regulator from a medical thermostat). In addition, for the purpose of regulating the thermostat temperature, an L-shaped thermometer is used which was prepared from an ordinary room thermometer; the scale of the thermometer is placed on the outside of the side of the trunk. In utilizing the bimetallic heat regulator, the thermostat may be left hooked up to the electrical system for an indefinitely long time without worrying about changes in its inside temperature. The insulation of

the walls of the trunk of the thermostat makes it possible to carry it disconnected from the electrical outlet for one to two hours without any change in the temperature. Inside the thermostat there are pockets in which glass vessels (flasks containing penicillin with rubber stoppers) are inserted with material for investigation. The arrangement of the pockets in the apparatus is a sectional one, which makes it possible to disinfect it when necessary.

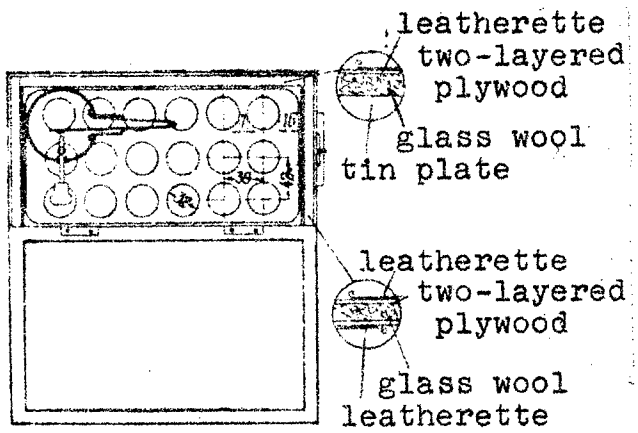


Fig. 2. Diagram of Portable Thermostat.

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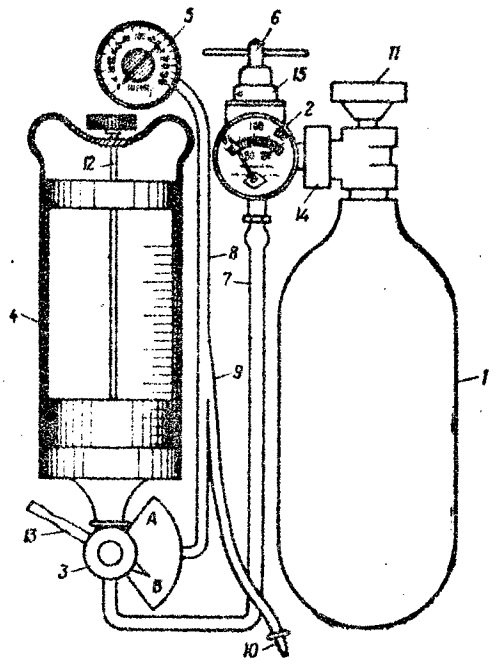
Apparatus for Oxygen Therapy

V. V. Lemesh, First Lieutenant of the Medical Service

The apparatus consists (see Figure) of a two-litter oxygen tank 1, reducer 15 with a regulator for the oxygen feed 6 and a high-pressure manometer 2, a syringe of 250 cubic centimeter capacity 4, an oxygen petcock-switch 3, a low-pressure manometer 5, and rubber hoses 7, 8, 9.



The oxygen feed regulator controls the pressure of the oxygen flow and allows or stops the oxygen feed into the syringe. The reducer is connected with the petcock-switch 3 by a rubber hose 7.

In position "a" of the petcock lever 13, the syringe is in communication with the tank; in position "b," with the oxygen tube 9. Two rubber hoses come off the petcock-switch. Hose 8 is connected with the manometer which records the pressure of oxygen which is introduced into the body. A metal cannula 10, onto which a fine rubber tube may be applied, or an irrigation tube with a rectal tip or a needle for administering oxygen subcutaneously, is inserted into the terminal portion of the hose 9.

The apparatus is mounted in a wooden box 42 x 26 x 16 centimeters in size. Before beginning work the tank valve 11 and the oxygen feed regulator are closed; the lever of the petcock-switch for the oxygen feed is in position "a"; the plunger of the syringe is as far down as possible. For

the purpose of administering oxygen, the tank valve and the oxygen feed regulator should be opened. Under the influence of the oxygen entering the syringe the plunger is raised to its extreme top level. Then, the oxygen feed regulator should be closed in order to stop any further influx of it into the syringe; then, the lever of the petcock-switch is changed over to position "b," and by hand pressure on the rod of the plunger 12 oxygen is administered to the body.

Where there is a need for administering large quantity of oxygen, the entire cycle is repeated. A single oxygen-filled tank under a pressure of 150 atmospheres is sufficient for accomplishing 120-130 procedures.

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Role of the St. Petersburg Medical-Surgical Academy in the Training of Military Pharmaceutical Personnel

(From the History of Russian Military Pharmacy)

S. I. Shavtsov, Colonel of the Medical Service

It has been 150 years since the Medical-Surgical (Military Medical) Academy organized the training of qualified pharmacists chiefly for the Army and Navy. This historic fact, unfortunately, has not been properly discussed in the periodical medical press. Nevertheless, it is interesting and instructive to bring back to memory the history of the organization of the training of military pharmaceutical personnel in the Academy.

At that time, the boundary between the 18th and 19th centuries, an acute insufficiency of pharmaceutical personnel was felt in Russia. There were many foreigners among the practising pharmacists. Russian pharmaceutical personnel were trained in small numbers and in a crude way, by means of apprenticeship. The apprentice worked and was trained for five or six years in a pharmacy or at a drug garden, after which he took examinations for being a pharmacist's assistant. The pharmacist had to serve in this capacity for two or three years in a field pharmacy. At the end of this time he was permitted to take examinations for apothecary which now gave him the right to occupy an independent pharmaceutical position.

The primitive nature of the training, naturally, did not provide a suitable theoretical preparation of the pharmacists, in connection with which ideas were expressed repeatedly concerning the creation of special pharmaceutical schools in Russia. The most eminent men in the Medical-Surgical Academy intended this also; they considered it expedient to organize such a school for the preparation of pharmacists at the Academy also; in their opinion, the Academy should prepare specialists both for medicine and for pharmacy. In the line of transforming the Medical-Surgical Academy (1805), it was mentioned that "...any large school supposes the existence in it of a pharmaceutical department. For the Academy this is particularly important, because pharmacists in Russia are all immigrant Germans, persons with a poor training and who have not mastered the Russian language. How many errors, how many misunderstandings there are under such conditions among the troops. It is time to concern ourselves with having educated pharmacists."

In 1808, the "pharmaceutical or apothecary school" was established as part of the Medical-Surgical Academy. The creation of a pharmaceutical school (department) at the Academy

where "skillful pharmacists" would be prepared for government pharmacies, including those servicing the needs of the Army and Navy, is an interesting page in the history of Russian military pharmacy. This was one of the first governmental higher pharmaceutical schools in the world and the only one in pre-revolutionary Russia.

The pharmaceutical department existed up to 1876. Almost its entire 70-year history may be divided into the following periods: the first -- from the time of creation in 1808 until the introduction of the rules and regulations for the Medical-Surgical Academy in 1835; the second period -- from the time of introduction of rules and regulations in 1835 until the adoption of the table of organization and equipment of the Academy in 1854; the third, from 1854 until the introduction of the 1869 rules and regulations for the Academy; and the fourth, after 1869.

During the first period of its existence the pharmaceutical department was manned chiefly by persons who came from the ecclesiatical seminaries; they were designed for "government dependency" and were therefore called government trainees. In addition, free attendants at the Academy could study there on their own account, but initially there were few of them.

According to the regulations of 1808, mathematics, physics, mineralogy, botany, zoology, chemistry, pharmacology and pharmacy were studied in the pharmaceutical department. These subjects, aside from pharmacy, were taken by the student of the pharmaceutical department at corresponding chairs of the Academy. For the purpose of teaching pharmacy or "the art of compounding medicines according to the prescription of physicians" a special chair was established. At first, it was headed by T. A. Smelovskiy (1772-1815), Professor of Pharmacy. After Smelovskiy's death, A. P. Nelyubin (1785-1858) was in charge of the chair of pharmacy for 28 years; he was a savant who had become famous for his scientific works in various fields of medicine and pharmacy.

After four years of training in the Academy the graduates of the pharmaceutical department were made candidates of pharmacy and were sent to military pharmacies to take a year's practical work: to the St. Petersburg Main Drug House, Kronshtadt, Revel and other drug houses. With their return from practice the candidates of pharmacy were given an examination at the Academy and, if they passed it successfully, were awarded the title of apothecary.

The next stage in the existence of the pharmaceutical department occurred with the introduction of the rules and regulations of the Medical-Surgical Academy approved 18 December 1835. The course of training was shortened from

four to three years, but for this reason the requirements in the training of those coming into the pharmaceutical department were made more rigid. Preference was given to those who had already worked in a pharmacy for four or at least three years. In addition, it was necessary to have a higher level of general educational training. Only in the event of the absence of such candidates was it permitted, as previously, to call candidates out of the ecclesiastical seminaries.

The list of subjects studied at the pharmaceutical department was broadened through the additional inclusion of Latin and Greek literature in the training program. Field trips were provided in botany, chemical and pharmaceutical exercises, and in the third year, practical exercises in pharmacy. With the conclusion of the three-year course in training and with the passing of public examinations, the graduates were awarded the title of gezel', and beginning with 1839 this title was changed to pharmacist's assistant. After three years of work in a pharmacy and under conditions where the pharmacist's assistant was given the proper recommendations he obtained the title of apothecary.

In 1854, "pharmaceutical vacancies" were eliminated from the staff of government trainees of the Academy, and beginning with that time a new, third period began in the existence of the pharmaceutical department. At that time, rules (1838, and then 1845) were operative in Russia according to which pharmacist's assistants desiring to obtain the title of apothecary had to take a full course in those sciences in which they were to be given examinations in the Medical-Surgical Academy or at the medical faculties of the universities. In accordance with this, pharmacist's assistants began to be admitted also to the Academy. After taking a course together with the pharmaceutical trainees they were then given the examinations for apothecary. After the elimination of the "pharmaceutical vacancies" from the staff of the Medical-Surgical Academy, only pharmacist's assistants were trained in the capacity of free attendants at the courses in the pharmaceutical department; the number of them was increasing all the time, and in the sixties this number amounted to 50-60 persons a year. The period of training was established as two years for them. During this time those studying in the pharmaceutical department went to lectures together with medical students. They acquired their practical training under the guidance of the professor of pharmacy ("chief of pharmaceutical operations") in the pharmacy of the Clinical Military Hospital (formerly, the second Military Land Hospital). It must be considered that the pharmaceutical department during this period did not differ in principle in the character of its activity from the apothecary courses

given at the medical faculties of the universities.

The final stage in the existence of the pharmaceutical department began with the introduction of the new principles for the Medical-Surgical Academy in 1869. For the purpose of training pharmacists (chiefly for military and naval duties) a three-year training period was established. Those coming to the pharmaceutical department had to have a gymnasium [secondary school] education. Because of these high requirements for general educational training, no persons desiring to enter the pharmaceutical department could be found. In the 80's there were two or three trainees there, and not every year at that. And, finally, beginning with 1876 the pharmaceutical departments ceased to exist. Officially, it was considered eliminated beginning with 1879, at which time a project was approved for transformation of the Academy. Some name another date -- 1881, when the interim regulations concerning the Military Medical Academy were approved. There is no mention of the pharmaceuitcal department in these documents.

In the 70 years of its existence, 395 qualified pharmacists were trained at the pharmaceutical department of the Medical-Surgical Academy, including: 46 pharmacists' assistants, 47 candidates of pharmacy, and 302 apothecaries. In addition, on grounds common to all medical faculties, the Medical-Surgical Academy examined pharmacists who had not studied in the pharmaceutical department. From 1813 through 1881, 1327 persons of the group of "outsiders" obtained the title of pharmacist's assistant (or gezel') at the Academy; 460 persons, the title of apothecary. One hundred persons were awarded the highest pharmaceutical title -- pharmacist, and 32, degree of learning of master of pharmacy.

The professorial staff of the Medical-Surgical Academy always referred to problems of organization of pharmaceutical education in Russia with great attention and insisted on the need for training pharmacists within the walls of the Academy, and attempted to make the graduating pharmacists highly qualified specialists.

As an example of the concern of the Academy Conference for the improvement of pharmaceutical education in Russia, the development of the project of the pharmaceutical institute which it undertook in 1844 along the type of the Derpt (Yur'yev) University existing at that time may be used. N. I. Pirogov and certain other Academy professors proposed organizing such an institute at the Academy. Unfortunately, the Conference had to stop the work on the organization of the pharmaceutical institute "because of a lack of funds in the Academy."

After the closure of the pharmaceutical department in

the Academy, the question of the organization of military pharmaceutical education in Russia arose and was discussed several times. Specifically, the Society of Pharmacists of Military and Naval Posts devoted much time and attention to it. The leading representatives of military pharmacy well understood the need for manning the main pharmaceutical posts in the Army and the Navy with specialists with a high degree of training who had obtained a complete pharmaceutical education. They suggested that the pharmaceutical department be restored at the Military Medical Academy and that the same departments be organized in universities. However, the discussion of the problem and the suggestions given by the Society did not lead to anything. Before the Great October Socialist Revolution in Russia, the system of training, the manner of taking practical experience, and the awarding of pharmaceutical titles was operative in Russia which had been established in 1845.

At the present time, work with military pharmaceutical personnel which has become a tradition is being continued by the Military Medical Order of Lenin Academy imeni S. M. Kirov. Here courses are being organized and given for the advancement of military pharmacists.

The 175th Anniversary of the Sevastopol' Naval Hospital

I. M. Kondrat'yev, Colonel of the Medical Service

This year marks the 175th anniversary since the date of founding of the Sevastopol' Naval Hospital. Its history is indisruptibly connected with the history of Sevastopol' and the Black Sea Fleet. Among the first buildings begun with the founding of the City in the summer of 1783 was the hospital. The hospital increased in size with the growth of the Black Sea Fleet. In 1800, with 300 beds at its disposal, the Sevastopol' Naval Hospital was located in a three-story stone building. Admirals Ushakov, Lazarev, Makhimov devoted considerable attention to the construction of the hospital. In 1840, a feldsher school was founded at the hospital.

In peace time, the Sevastopol' Naval Hospital was a base for the treatment of sailors of the Black Sea Fleet. In war time, during the period of the two glorious defenses of the City, the hospital was twice destroyed to its foundation, but it maintained its fighting capacity after being repeatedly rebased and evacuated.

In the first defense of Sevastopol' in 1854-1855, the hospital had been designed for 1800 beds, providing therapeutic care for all wounded and sick sailors.

Everything new in military field surgery which was introduced into medical practice by the corypheus of Russian surgery, N. I. Pirogov, during his stay in besieged Sevastopol', was applied in the Sevastopol' Naval Hospital. During the years of defense, Pirogov's student, D. A. Golubkin, was the assistant to the chief doctor.

After the defense of Sevastopol', the hospital was slowly rebuilt. Only in the last quarter of the 19th century was it removed again to the place where it now stands. The eminent organizer of naval medicine, V. S. Kudrin, invested considerable effort and initiative in the construction of the hospital. At the beginning of the 20th century, the hospital had become quite a well-run medical installation equipped with an X-ray apparatus and a laboratory.

The first scientific works of the hospital physicians were created in the middle of the 19th century. Among them mention whould be made of the first monograph on naval medicine in Russia -- "Sea Sickness" published in 1844. Considerable attention was devoted to the medical-topographic description of Sevastopol'. Articles on this topic were published in 1845, 1850, 1869, 1908.

In 1890, the Scientific Society of Naval Physicians was created at the hospital. In the years before the Revolution the members of the Society published more than 60 articles

and reviews. In 1913, at the All-Russian Exposition on Hygiene the Sevastopol' Hospital was awarded an honorary diploma and a large silver medal for its exemplary medical equipment.

A period of vigorous development of the hospital was initiated with the establishment of the Soviet regime in the Crimea. The number of beds was increased, new operating room, physiotherapy department, three X-ray clinics, and a mechanized laundry were built. A rich medical library was created, and the volume of scientific and pedagogical work on the training of nurses, feldshers and others was expanded.

During the Second World War, the hospital suffered a serious tragedy. During the evacuation from Sevastopol' to the Caucasus in 1941, the wounded, the major portion of the physician personnel and a large portion of the equipment were destroyed in transportation. A few of the workers who recovered served as the nucleus around which the Sevastopol' Naval Hospital was reformed at the end of 1941.

During the war years, the hospital changed its classification, and the volume of work many times depending on the circumstances in the Black Sea Theater of War. It carried out the functions of an evacuation hospital (Sochi, 1942 and 1944), of a rear hospital (Tbilisi, 1942), of a medical battalion (affiliate at Sevastopol' in 1942), and carried out the specialized treatment of the wounded and the sick under the most varied conditions, concentrating naval contingents within itself. Many thousands of sick and wounded sailors were treated in it during the war years. From 77 to 92 percent of them were returned to duty. Under the most difficult conditions, in 1941-1942 the use of the plaster cast was adopted in practice. In 1942, a monograph "The Plaster Cast" was published in Sochi which had been written by the flagship surgeon of the Black Sea Fleet, B. A. Petrov, and by the chief hospital surgeon, Ye. V. Smirnov.

During the Second World War the work of the hospital was highly praised: the Presidium of the Supreme Soviet USSR awarded it the Order of the Red Banner. Scores of medical workers and hospital employees were awarded orders and medals of the Soviet Union.

In post-war years, the number of beds was restored and increased, and the hospital departments were furnished with the latest equipment. A specialized base with many profiles for the treatment of Black Sea Fleet sailors was created. The patients had the advantage of all the modern methods of diagnosis and treatment. The hospital physicians gave qualified care under the most varied conditions (distant trips, trawling, under-water emergency work, etc.). Considerable pedagogical work was developed. The hospital has been

the base for the training of nurses, laboratory technicians, X-ray technicians, and for the advancement of medical service officers. The physicians, nurses, aid men, and service men who through their labor have won the confidence of sailors are the pride of the hospital.

Beginning with 1942, the hospital physicians wrote more than 130 scientific works; over 90 of them have been published. In 1958 alone, the following were published: "Collection of Scientific Works" (37 articles and abstracts), three pamphlets, seven articles in the periodical press. Five dissertations for the degree of learning of candidate of medical sciences were written and defended. The hospital Communists are in the lead in the matter of battle training and therapeutic-prophylactic work, rallying around themselves the entire group of medical workers and service men. The hospital is the center of medical scientific thought and practical medical activity for the Black Sea Fleet.

The Sevastopol' Naval, now the Red Banner Naval Hospital of the Black Sea Fleet, has traversed a serious and difficult but glorious route. The devotion of the entire group of hospital workers to the Fatherland is the pledge that the hospital will in the future carry out with honor the problems confronting it.

The 150th Anniversary of the Odessa District Military Hospital

B. V. Bokhanov, Major of the Medical Service

Recently, a solemn meeting was held in the District Officers Club devoted to the 150th anniversary of the Odessa District Military Hospital. Colonel of the Medical Service A. G. Bel'tyukov gave a report on the anniversary.

Beginning with the first few days of its existence, the hospital was one of the great medical installations of the time. During the Crimean War 1853-1856, it gave considerable aid to the sick and wounded evacuated from the Crimean Peninsula. At the end of the seventies, the Odessa Hospital was visited by the outstanding physician and scientist, the founder of military field surgery N. I. Pirogov. This is what he wrote about the hospital in his book "Military Medical Matters and Specific Care in the War Theater in Bulgaria and in the Rear of the Army in the Field in 1877-1878": "...I visited Odessa three times during the War. The first time, in August 1877, I found several hundreds of wounded already there... the second time we visited Odessa in February 1878 ...despite the fact that Odessa was called upon to take care of the wounded and sick later than the other cities (only in August 1877), the Odessa local directorate of the Red Cross had succeeded in giving complete aid to 8,000 sick and wounded persons at the time of our visit."

The present history of the Hospital begins after the Great October Socialist Revolution. Immediately after the October Revolution the Hospital became included in the group of medical installations of the Soviet Army. During the serious years of the Civil War and of destruction when epidemics broke out in the South of Soviet Russia, the medical group of the Hospital did heroic work in controlling the infectious diseases.

In 1920, a number of clinics of the Medical Institute were opened up in the Hospital -- internal medical, gynecological, surgical, otolaryngological, in which the greatest specialists worked at various times -- Professors V. P. Filatov, N. A. Kukoverov, Ya. K. Gimmel'farb, and others.

Beginning with the first few days of the Second World War, the Odessa Hospital was one of the best qualified hospitals in the Soviet Army, and its group did great work in restoring the health of thousands of sick and wounded and returning them to duty. During the post-war years the hospital personnel, after restoring the destroyed quarters and equipment, have steadily improved therapeutic-diagnostic work.

At the present time the hospital physicians are persistently incorporating the modern achievements of medical science into therapeutic-prophylactic work. The hospital surgeons have mastered operative procedures on the chest cage: lobectomy, pericardiectomy, thoracoplasty, and thoracocautery. New types of anesthesia have been adopted -- intratracheal, potentiated, etc. The surgical department has been equipped with a central apparatus feed of oxygen, carbon dioxide, and nitrous oxide in the operating rooms and the post-operative wards. Osteosynthesis is being utilized extensively for fractures of the long bones.

The experienced specialists N. A. Arbuzov, A. A. Bari, A. I. Ivanov, M. I. Volovich, K. T. Gryanko, A. A. Unegov, Ye. I. Yanovskiy are working productively in the Hospital. Along with them a large detachment of medical workers -- employees of the Soviet Army -- is working with them in a self-sacrificing manner. The physicians, V. V. Luzina, A. Ye. Leutskaya, and the nurses T. K. Skurkovskaya, M. Kul'chitskaya and others are enjoying a deserved authority.

During the past ten years the group of physicians has prepared 230 scientific works; more than 100 of them have been published.

In honor of its 150th anniversary, the Odessa Hospital welcomed the representatives of Party and community organizations, medical installations and military units. The hospital group warmly greeted Major General N. I. Kryukov from the Military Soviet and the Political Administration of the District.

Welcoming telegrams were sent to the Odessa Hospital from the Minister of Health of the UkrSSR and from the chief of the Main Military Medical Administration of the Soviet Army. A scientific practical conference was held devoted to the anniversary of the Hospital.

Certain Information on the Medical Care of the Russian Army in the Poltava Campaign 27 June (8 July) 1709

(Historic Reference to the 250th Anniversary of the Battle)

Docent S. A. Semeka, Major General of the Medical Service

In July 1959 it was 250 years since the date of the victory of the Russian troops in the battle near Poltava.

The Poltava campaign 27 June (8 July) 1709 wrote new pages in the history of Russian and world military art; it showed that the Russian Army was the best army in Europe at that time.

The national Russian regular army, made up of recruits, was created as a replacement for the standing army of the 17th century which possessed only elements of "regularity." This army was perfected and toughened in the battles of the Northern War [with Sweden] and soon showed its immeasurable superiority over the hired armies of feudal Europe. The national unity, patriotism, solid ties [the word actually means "solder"] and supreme daring and courage were expressed as inalienable qualities of the Russian soldier. At the same time, recognition of the soldiers' having the main deciding role in war, which was an inalienable tradition of the best Russian leaders, also presaged great concern for the health of the soldiers and the comparatively high organizational level of medical care in the Russian Army at that time which far exceeded the organizational level of medical care in the armed forces of the principal governments of Western Europe.

The military medical organizations of the Russian Army was formed and perfected as an inalienable part of the structure of the Russian regular armed forces. At the time of the historic Poltava campaign, its formation had not as yet taken on clear-cut regularly established forms; however, the general outlines of the system of medical care had been constructed quite distinctly by that time.

After suffering a bitter defeat at Narva (19 November 1700), the Russian Army did not lose its fighting capacity; it persistently perfected its armed forces. After this followed the victories at Erestfer, Marienburg, the capture of Noteburg (the old Russian city of Oreshok), the winning of Derpt (Yur'yev) and Narva. After conquering Ingria in the same way, Peter the First advanced the Russian Army to the aid of the allied Saxon king, August II. However, the conclusion of the Anthranstadt Separate Peace with Charles XII by August II placed the Russian Army in a serious position. Now, it had to carry on the war by itself with the powerful Sweden of that time.

In 1708, the Swedish Army stormed into Russia and captured Mogilev.

After a number of attempts to break into Smolensk, experiencing progressively greater difficulties as the result of the destruction of the locality and the active operations of Belorussian guerrillas, Charles XII was forced to defer his attempts at making a direct attack on Moscow and move his army to the Ukraine, counting on support promised him by Hetman Mazepa, traitor of the Ukrainian people.

At the end of April 1709, the Swedes began the siege of Poltava, concentrating for a break-through to Belgorod and from there to Moscow. However, they encountered heroic resistance by the small garrison (4200 soldiers and 2500 armed inhabitants) and were unable to achieve success for three months, despite great losses. And, finally, on 27 June 1709, the historic general Poltava campaign broke out, which serves as a monument to the military glory of Russian arms, and the unyielding staunchness and patriotism of the Russian soldier.

History has not preserved for us any specific documentary data concerning the nature of the medical care of the wounded in the Poltava campaign. It is known that in every infantry and cavalry regiment in 1706 there was a regimental physician with a regimental apothecary according to lists (organic units); in every company there was a barber (company feldsher); the "commanding general" had a doctor, a staff-physician (general physician) and an apothecary with a field pharmacy. The training of the barbers (company feldshers) was the responsibility of regimental physicians, for which purpose they were obliged to select one soldier from every company; he was given a "double salary." (Ukase of 1706. The Letters and Papers of Peter the Great, Volume 4, No 1302). A part of the barbers and regimental physicians operated directly in the rear of the battle formations of the regiments during the campaign, giving aid to the wounded ("for the first dressing"); all the other medical personnel -- doctors, staff physician, physicians and barbers -- were concentrated in the baggage-trains of the army, which in the Poltava campaign were at a distance of one-quarter mile behind the battle formations (order of battle). (The Letters and Papers of Peter the Great, Volume IX, Moscow, 1950, No 3297, page 259). It was here, evidently, that "the site of the main redressing" was located and specifically here, it must be supposed, that Peter "...consoled the most dangerously wounded, saying that the striving of the physicians could cure them." He gave an order "concerning the unceasing attempt to cure them and maintain them." (Golikov I. Supplement to the Deeds of Peter the Great, Volume XV, Moscow, 1795).

At that time, the evacuation of the wounded during the

course of the campaign in all of the European armies was not only not organized but in the majority of armies it was directly prohibited so as not to disturb the battle formations in the line or to distract the soldiers for this purpose. Only in the Russian Army at that time were the first attempts made to evacuate the wounded during the course of the battle, for which "Articles During a Military Campaign" 1704 (page 7) permitted the use of non-combatants; officers' servants, halberdiers, writers, trumpeters, extra drummers, etc. During the Poltava Battle, tremendous work lay on the shoulders of the few medical personnel at that time, who successfully coped not only with the problem of rendering medical aid to 3292 wounded Russian soldiers but also to even more numerous wounded Swedes.

In Poltava, after being freed from the siege, several field hospitals were hurriedly set up, and all the wounded were brought there, where they were well accommodated and remained until their complete recovery. Peter visited the wounded in the field hospitals and, "seeing the good order" in which they were kept, expressed his "sincere appreciation" to the commandant. With characteristic humaneness of the Russian Army, even the wounded Swedes were not left unattended. Peter "ordered that they be left in the Poltava hospitals." (Golikov I. Ibid.) The Poltava campaign was a historic occurrence, a new stage on the route of development of Soviet and world military art; it played a considerable part also in the route of future development of the military medical organization of the Russian Army.

Journal of Military Medicine of the Rumanian People's Republic

F. V. Arsent'yev

The military medical journal "Revista Sanitara Militara" is the organ of the service troops of the armed forces of the Rumanian People's Republic.

The series of journals for 1958 consists of six issues having a volume of about 10 quires each. The main purpose of the Journal is to contribute to the perfection of the medical service of the armed forces of the Rumanian People's Republic -- a full-fledged member of the great socialist camp.

During the years of democracy the public health of the Rumanian People's Republic has achieved notable successes, which was the result of the correct policies of the Rumanian Workers Party and the brotherly assistance of the socialist countries. This progress is illustrated by the following facts. While in 1938, under the bourgeois-landowner system, there was one physician for 2200 inhabitants; the birth rate was equal to 19.9; the mortality rate amounted to 20 per 1000 population, that is, there was actually no natural increase in the population; in 1955, there was one physician per 825 inhabitants; the mortality rate had dropped to 9.6 per 1000, and the natural increase in population amounted to 15.8 per 1000. Many infectious diseases completely disappeared, whereas in 1945 they had been recorded in hundreds of thousands of cases.

Against the background of these achievements in the field of public health, the progress of the medical service of the armed forces of the Rumanian People's Republic is indubitable. Material published in the journal of military medicine speaks for the productive scientific research and scientific practical work which is being accomplished by physicians of the army of the Rumanian People's Republic.

The thematics of the Journal during this period were very varied, but the leading problems of interest to the editorial staff of the Journal devoted to problems of military medicine could still be clearly defined. Each issue of "Revista Sanitara Militara" has a definite purpose -- tp throw light on some particular topic, and it may be noted that the selection of articles has been rather good. Each issue has acquired a characteristic appearance, and at the same time it has not lost a certain systematism, to which the structure of all the issues of the Journal is subordinate. Thus, in the Journal there are sections of original investigations, general medicine, brief reviews, observations from practice, etc. In addition, in the Journal light is thrown on the most significant events in the field of world civilian and military medicine: congresses, conferences, symposia.

The activity of the military medical section (Bucharest Affiliate) of the Scientific Medical Society is quite fully reflected. The Journal has a section in which abstracts are printed of works of foreign authors.

The activity of military physicians -- efficiency experts and innovators -- is enjoying a merited attention.

Many articles are documented with well-executed figures, tables, diagrams, roentgenograms, and microphotographs. The Journal gives a resume of articles in Russian, English, and French. The active participation of S. Longin, Lieutenant General of the Medical Service, K. Zamfir, and I. Atanasiu, Major Generals of the Medical Service and others leading specialists in the field of military medicine of the Rumanian People's Republic, who are not only members of the editorial board but are also the authors of works in the Journal, in the activity of the Journal may be noted to the credit of the Journal. It is very noteworthy that the Journal of military medicine has its own permanent author group among military physicians who are regularly given space on its pages.

Clinical medicine is represented in the Journal by several sections, among which one of the most important places is rightfully given to surgery and particularly to military field surgery.

Problems of current importance are taken up in the article by Ye. Maresh and his colleagues which has been published in No 2. The authors analyze the surgical tactics in the operative treatment of wounds of large arterial trunks in detail under conditions of battle circumstances, and ground indications for such therapy; they emphasize that the possibilities of conservative and restorative surgery of the blood vessels under field conditions have been expanded considerably through great progress achieved by medical science. The article is well illustrated with diagrams and figures.

The experimental work of P. Kostescu, Major General of the Medical Service, and his co-workers, published in Journal No 3, is of current importance and of great practical significance. The authors have obtained favorable results in treatment of compound fractures early and late by means of intramedullary osteosynthesis with a metal pin; they believe it entirely possible to use such treatment under field conditions. I. Shuteu, in Nos 1 and 2, published articles in which problems of prophylaxis and treatment of traumatic and infectious pathology of the hand was dealt with under conditions of peace and war time. This author, in an experimental work which presents considerations concerning the matter of controlling shock in the wounded under field conditions (No 4), comes to the conclusion that under battle circumstances it is more expedient to utilize the rectal administration of novo-

cain solution for the prophylaxis of shock in the wounded, because this is readily accomplished and does not require strict asepsis; this would be more reasonable than to inject novocain intravenously or to use chloral hydrate anesthesia.

The attention which is given by the Journal to modern measures and methods of anesthesia as applied to battle conditions is completely justified. In connection with this, mention may be made of Sh. Antoniscu's article "The Use of Neuroplegic Substances in Therapeutics" (No 6), but particularly important problems are raised by Major General P. Kostescu, of the Medical Service, and others who, based on the experience of Soviet and Rumanian medicine, are working out a quite harmonious system of measures for the use of local and general anesthesia facilities in different medical installations during a period of battle operations ("Anesthesia on the Battlefield," No 6). In the battalion medical aid station and regimental medical aid station, use would be made of local anesthesia, morphine, and neuroplegic agents. In the division medical aid station and in the mobile surgical field hospital, it would be more reasonable to utilize local and combined local-regional anesthesia for wounds of the extremities, head, chest, and general anesthesia for severe wounds in the abdomen and chest cage as soon as the wounded are brought out of a state of shock. In the front-line and rear hospitals, use may be made of various types of anesthesia, depending on the nature of the wound, and intratracheal anesthesia may be widely used.

The series of articles by I. Atansiu, written by him in conjunction with his colleagues, are of undoubted interest for the urological surgeon. In this series note should be made, first of all, of the work "Treatment of Urethral Tears Under Field Conditions" in Journal No 4, in which the authors insisted on active utilization of operative methods of treatment at various stages of evacuation. In order that the aid given be of a more specialized type, it is recommended that the most rapid methods of evacuation (aviation) be utilized from the front lines to medical installations at the front and to specialized hospitals.

It is to the credit of the Journal that it is trying to acquaint broad groups of military physicians of the Rumanian People's Republic with the modern achievements of Soviet medical science and with the experience in utilization of them under local conditions. In No 6, six articles are published, chiefly of a review nature, on various specialties: surgery, internal medicine, ophthalmology, laboratory work, and immunology. Judging by the nature of the articles, the teaching of I. P. Pavlov and the ideas of nervism are the standpoints from which many problems of theory and practice

are being analyzed in Rumanian military medicine. Works of N. N. Burdenko, A. V. Vishnevskiy, E. A. Asratyan, A. A. Smorodintsev and other Soviet research workers are in the center of attention. Lumbar novocain block, local anesthesia, methods of treatment of subacute bacterial endocarditis are being used extensively by Rumanian military physicians. Great interest is being shown in modern methods of research: fluoromicroscopy, autohistoradiography, analysis of ultrasound, electrophoresis, etc.

The Journal is giving considerable attention to the problem of diseases of internal organs, whereby special emphasis is being laid on the prophylaxis of a number of diseases in the army. It is exceptionally important that in many articles a number of measures is being mentioned specifically which are directed at the prevention of the most serious or most frequently encountered diseases, such as rheumatic fever, tuberculosis, diseases of the digestive tract, etc. (K. Zamfir and co-workers, G. Vyzh and E. Vayner, L. Aleksiu and G. Georgiu).

The works of K. Zamfir, Major General of the Medical Service, and his colleagues in Journal No 2 -- "The Etiology, Pathogenesis and Treatment of Acute Pulmonary Edema" -- completely and thoroughly characterizes one of the most dangerous complications in the division of internal pathology and contains scientifically grounded recommendations for the quickest possible elimination of this very severe condition.

Of the articles printed under the rubric of "Original Investigations," I. Popovich's work "New Conception in Connection with Certain Problems of Eye Physiology" is of great scientific interest; in it the author advances a number of theoretical principles which shed light on the function of the ciliarly muscle and on its interaction with the substance of the vitrous humor. Based on these theoretical premises, the author attempts to discuss certain problems of ophthalmology from a new angle and to outline means for the practical utilization of the results of his investigations for the treatment of myopia, glaucoma, etc.

On the pages of the Journal, a considerable place is occupied by the section on epidemiology, prophylaxis of infections, and immunology. In connection with the universal and quite extensive distribution of epidemic hepatitis not only among the civilian population but also among the military, a number of authors are opportunely posing the question of effective measures of prophylaxis and early diagnosis of this infection; the great part of sanitation propaganda among the troops is emphasized (V. Tudor and colleagues, D. Dogeru and F. Uleu).

I. Berlodzha and his colleagues indicate the need for

increasing prophylactic measures directed at the elimination of staphylococcic infections in the military medium in one of the articles.

A case presented in Journal No 4 by V. Muntyanu, Colonel of the Medical Service, in the article "With Respect to the Large-Scale Trichinella Infestations in a Single Military Group" is very instructive.

Problems of organizational nature are presented in the Journal for 1958 in a series of articles, of which the works of V. Sava and I. Menade and co-workers (No 1) concerning the part of sanitation education of service men in prophylaxis of traumatism deserve attention. The article of V. Rakovichanu and others in No 3 is devoted to essential problems of organization of correct evacuation of the sick and wounded by air transportation. The authors insist on a strict selection of the wounded depending on the nature and severity of the wound, and obligatory consideration of meteorological factors and of the type of the aircraft.

Undoubtedly, the problems of air force medicine are touched on in a number of articles, are timely and of current importance. This section in the Journal deservedly occupies one of the important places. V. Lascarovic, Colonel of the Medical Service, and other authors (No 1) in examining a group of fliers found the existence of deafness as the result of sonic trauma occurring as the result of the operation of the motors of modern airplanes. For the purpose of determining suitability for further service in the air force, the authors suggest, in addition to the classic methods, the use of a practical flight test; prophylactic measures are presented. Nor are certain other problems of the flight medical board evaluation forgotten.

In the sixth issue of the Journal in the article "X-ray Investigation of the Heart in the Medical Board Evaluation of Flight Crews," based on many years' experience in the study of orthodiagrams of the heart in persons in the air force, E. Kosheru could not find any convincing data attesting to heart disease.

One of the main problems of air force (and cosmic) medicine is the problem of the influence of acceleration on the human body during flight. The difficult problem of mitigating the harmful effect of acceleration on the pilot's body was discussed in Journal No 4 in the work of V. Teodorescu.

The problem associated with the elimination of the undesirable effect of a marked drop in atmospheric pressure on the pilot's body is considered to be no less important. V. Razovichanu, E. Kosatru and M. Stoyan (No 5) suggest the inhalation of oxygen before an ascent and during the ascent

for this purpose; the oxygen displaces the nitrogen from the body producing severe disorders of physiologic functions of the body with an ascent to high altitudes.

An analysis of the causes of traumatism and recommendations for prevention of accidents among parachute troops are given in N. Barbulescu's article "The Study of Accidents During Parachuting and the Prevention of Them" (No 5).

The anti-atomic defense of the troops is in the center of the attention of military medicine in the Rumanian People's Republic, as may be judged by the topics of the Journal. The articles devoted to this problem are concentrated chiefly in the fourth issue. "Radiation Which Occurs From the Atomic Blast" is the title of the article by I. Balshanu and P. Nagirnyak in which general information is given on atomic weapons. The authors speak of the effect of radiation on the body and list the measures of anti-atomic defense. In another article these authors discuss the problem of contamination of the soil by radioactive substances, indicate the possible routes of penetration and the effect of them on the body. One of the articles of E. Kosheru is devoted to this very important problem; he believes that under conditions of their everyday work fliers belong in the category of persons who are most exposed to the danger of ionizing radiation because of the following: 1) frequent X-ray examinations; 2) high level of cosmic radiation at high altitudes, and 3) large number of indicators and dials with fluorescent covering in the airplane cockpits.

In D. Yancu's article "The Protection from and Prophylaxis of the Radioactive Effects of Atomic Weapons and Military Radioactive Substances" a list is contained of the protective measures against the effect of radioactivity, and methods of decontamination of a contaminated body are indicated as well as methods of sanitary processing, etc.

This is the far from complete list of the main works published on the pages of the Journal for 1958. It is to the undoubted credit of the Journal that is systematically reflects the activity of the military medical section of the Scientific Medical Society of the Rumanian People's Republic in the form of bulletins, and inevitably echoes all the significant events of international medical life. Thus, the Journal published the main material concerning the following works: "The International Conference in Tokyo on the Study of the Consequences of the Atomic Bombardment of Hiroshima and Nagasaki (1955), Fifteenth Congress of the International Organization of Military Medicine (1957), Congress of Athletic Medicine in Moscow (1958), etc.

The Journal maintains a permanent abstract section in which the main content of the most interesting articles from

the periodical publications of other countries is discussed. A considerable place in this section is given over to works of Soviet authors.

We should like to wish the Journal of Military Medicine of the Rumanian People's Republic further success in the advancement of the knowledge of military physicians in the democracy of Rumania, in the strengthening of international medical associations and primarily associations with brother countries of the Socialist camp.

Sanitary Protection of Open Water Bodies Against Contamination By Radioactive Substances

(A. N. Marey. Sanitary Protection of Open Water Bodies Against Contamination by Radioactive Substances. Medgiz, 1958, 92 pages. Price two rubles 70 kopecks).

I. Ya. Vasilenko, Lieutenant Colonel of Medical Service, Candidate of Medical Sciences

In the Soviet Union atomic energy is being used to a progressively greater extent every year. Atomic power stations are operating successfully, and the production of radioisotopes is being increased; they are being used extensively not only in science but also in the national economy.

The current technical level makes it possible to avoid contamination of the environment with the use of atomic energy. However, with a violation of established routines contamination of the atmospheric air, soil and sources of water may occur. In this connection the publication of A. N. Marey's monograph which is now being criticized is of indubitable interest for military physicians.

In the first section of the book, "Hygienic Evaluation of Possible Effect of Certain Radioactive Elements on the Sanitary Conditions of Living and Health of the Population" the problem is briefly discussed of the routes of contamination of water bodies by radioactive substances. The author analyzes the fate of radioisotopes in detail which enter open water bodies in the sewage. A considerable portion of radioactive substances is sorbed onto the surface of suspended particles which are in the water; a certain part of the isotopes is sorbed onto the surface of the bottom, objects and living organisms which are under the water. Therefore, the bottom of a water body is the place where an accumulation of radioactive substances occors. In the event of entrance of isotopes which have a slow rate of disintegration into the water body a considerable quantity of them may accumulate on the bottom, and the water body will be contaminated for a long time. In this case the bottom deposits will constitute a potential danger as a source of secondary contamination of the water with radioactive substances. It should be emphasized particularly that contamination of the water body with radioactive substances inevitably leads to a contamination of the water flora and fauna. A. N. Marey, based on the investigations of V. I. Vernadskiy, A. P. Vinogradov and A. O. Boynar as well as on his own observations, gives a considerable place to this

problem. The author justifiably indicates that the possibility of contamination of the population as a result of using water and food products--fish, water birds, etc. should be taken into consideration in giving a sound basis to maximum permissible concentrations of radioactive substances in water bodies.

In this section certain data are also presented concerning the biologic effect of radioactive substances.

In connection with the possibility of an influx of radioactive substances in the water bodies it is no longer possible to be restricted to ordinary examinations of them in the sanitary study of the water bodies, that is, an examination by sanitary-chemical and bacteriological studies of selected water samples of bottom deposits and water organisms. In this case, a special sanitary-dosimetric examination is necessary. However, this problem has not been adequately discussed on the pages of the Soviet press nor on the pages of the foreign press. Therefore, the second section of this monography, "Methods of Sanitary-Dosimetric Control of the Purity of Open Water Bodies and Other Sources of Water Supply" is of particular interest.

The order of dosimetric examination of the sewage system (in the event it is utilized for the removal of radioactive substances from places of work along with the sewage), of open water bodies, water conduit structures and subterranean sources of water supply is presented in adequate detail in the book. The author correctly indicates that the sanitary examination of water bodies, in the event they are contaminated with radioactive substances, should be complete and should include the following: preliminary acquaintance with existing material on the general and sanitary characterization of the given water body; sanitary-topographic examination of the water body, acquaintance with the sanitary condition of coastal inhabitated places and the nature of utilization of the water body, the performance of hydrometric measurements and hydrobiological examination, sanitary-chemical and bacteriological investigation; a special sanitary investigation of the water body and of the coastal territory including dosimetric and radiochemical investigations. In this section of the book brief information is given concerning certain field dosimetric apparatuses and principles of radiometric investigations.

Treatment of the data obtained and an evaluation of them are of importance in any investigation. Unfortunately, the third section of the book, "Treatment of the Material and Hygienic Evaluation of Them" has been presented by the author in an extremely condensed form. Taking into consideration the importance of this section as well as of the ab-

sence of sufficient experience in this problem on the part of medical workers the author should present this section in greater detail in the second edition of the book.

The last section of the book acquaints the reader with certain methods of deactivation of sewage.

In the appendix data are presented concerning the provisional maximum permissible levels of ionizing radiation and the natural concentration of radioactive potassium in food product.

The monograph being criticized contains valuable information not only for physician-hygienists but also for military physicians in other specialties.

Collection of Scientific Works of the Red Banner Naval Hospital of the Black Sea Fleet

(Sevastopol', 1958, 221 pages Piblication of the Printing House of the Newspaper "Flag of the Fatherland).

V. I. Uskov, Colonel of the Medical Service

The problems of development of medical science in the Soviet Union are being solved successfully by the creative collaboration of scientific and practical workers. Representatives of military and naval medicine, among whom there are a large number of troop and hospital physicians, are taking a progressively greater part in the scientific research work. A large group of military physicians full of enthusiasm for making their contribution to the matter of developing medical science is successfully incorporating two methods of diagnosis and treatment into oractice and in perfecting medical work. Therefore, the useful initiative of naval physicians of the Red Banner Naval Hospital of the Black Sea Fleet in publishing a collection of scientific works of the hospital devoted to the 175th anniversary of the founding of Sevastopol' is completely understandable.

In the collection scientific works done by hospital physicians during the period 1957-1958 are published in the collection. For the hospital the production of such a collection, the first one published, is a great achievement. The material which is published in the collection attest primarily to the considerable strivings and interest of hospital physicians in scientific research work. As is seen from the works of the collection, the hospital specialists not only utilized the achievements of modern medical science on their work but are looking for and incorporating into their practice new measures and methods of treating patients. All the works which were published in the collection are chiefly of practical importance, and contain considerable factual material and are of indubitable value for the medical service.

The collection would have been even more useful if it had included articles concerning works of hospital physicians on therapeutic-ptrphylactic care of the troop units and ships. Unfortunately, the problems or organization of medical care in it are represented by only a single article.

The book is begun with an article by P. I. Gorbatyy and I. M. Kondrat'yev, "The Hospital of the Black Sea Fleet", which sapidly presents the glorious history of the Sevastopol' Naval Hospital. The authors went about their work quite properly, giving the main attention in the article to the

part of the hospital in the period of defense of Sevastopol' 1854-1855 and pa ticularly to the activity of its group during the rigorous years of the Second World War. The work of the hospital during the period of the Second World War, as is known, was highly praised: it was awarded The Order of the Red Banner. The authors present considerable factual material concerning the achievements of the hospital in therapeutic-prophylactic and scientific research work in the past 15 years.

Very interesting are the articles of M. G. Shapunov, participant of the heroic defense of Sevastopol', Colonel of the Medical Service and candidate of medical sciences, "The Work of the Naval Hospital During the Last Few Days of the Defense of Sevastopol' 1942", which is a sort of direct supplement to the preceding work. The articles are very instructive for military physicians today. The author clearly and picturesquely relates the heroic deeds of a hospital group who worked under the ground under the conditions of the besieged city. Under the conditions of continuous shell fire and bombardment the hospital group, in dark and crowded quarters, at times without water or light, fought to save the lives of the wounded and return them to duty as quickly as possible. Not uncommonly, up to 300 wounded persons passed through the operating room and dressing room department in 24 hours.

The first part of the collection includes 22 articles which deal with problems of the clinical aspects and therapy in various internal medical and surgical diseases; the second part, observations from practice and therapeutic notes--10 articles; the third part, brief abstracts, three articles.

It is quite natural that among the clinical articles of the collection the reader would like to find topics which are of the greatest interest to the military physicians, that is, investigations in the field of military field surgery and naval surgery and therapy. However, the requirements and interests of the military physicians are considered inadequately among the topics of the articles. Therefore, we shall dwell only on the works which are of the greatest importance for the practice of the military physician.

In Ya. A. Rubanov's article "The Problem of Reflex Disturbances in the Cardiac Activity From Pains in the Abdomen" clinical and electrocardiographic research data are presented on 64 patients with the aim of establishing a pathogenetic connection between the pains in the abdomen and disturbances in cardiac activity. In comparing the electrocardiograms taken at rest and in the presence of pains in the abdomen produced by palpitation, the authors were able to construct a more distinct concept of the relationship of

pains with the disturbances in cardiac activity of which the abdominal pains were the main course.

The article by D. I. Fin'ko and V. A. Smirnov, "The Symptomatology and Characteristics of the Course of Acute Leukemias According to the Material of the Naval Hospital for Ten Years" shows how difficulties in diagnosis and inadequate acquaintance of the unit physicians with the clinical aspect of acute leukemias lead to the fact that the initial stages of the disease are not recognized. The variety of diagnoses with which the patients were sent into the hospital (sore throat, rheumatic fever, scurvy, Werlhof's disease, chronic septicemia, stomatitis, pneumonia, myocarditis) indicates the difficulties in diagnosis of acute leukemias under the conditions of the military unit or ship. At the time of admission to the hospital the patients usually complained of general weakness, malaise, pains in the throat on swallowing, headaches, and a hemorrhagic tendency of the gums. The most frequent signs were enlargement of the lymph nodes, the sign of a hemorrhagic diathesis, pains in the bones, sore throat, enlargement of the liver, spleen, high temperature, anemia, accelerated sedimentation rate. The authors draw a conclusion which is important for the practice of the troop and ship physician: for purposes of the early diagnosis of leukemias in patients with a chronic course of sore throat, with hemorrhagic diathesis, hyperplasia of the lymph nodes, arthritides and stomatitides of unknown etiology a hematologic examination should be performed.

The article "Treatment of Botkin's Disease with Plasma Transfusion" (D. I. Fin'ko and B. G. Min'ko) acquaints the reader with the results of application of this type of therapy in large group of patients with Botkin's disease and in two patients with acute atrophy of the liver. According to the authors' data, the transfusion of plasma in Botkin's disease contributes to a more rapid reduction of the total bilirubin in the blood in the majority of patients and a decrease in the general toxic signs. The icteric period in them is shorter by an average of five-ten days compared with the control group which is analogous in severity of the disease.

In the article by N. I. Pogorolov and V. P. Zakharov "The Importance of Measuring the Temporal Arterial Pressure in the Medical Board Evaluation of Headaches" interesting data are presented which are of practical importance in the differential diagnosis of neurocirculatory asthenia, hypertensive disease and neurasthenia. The authors come to the conclusion that the method of measuring the temporal pressure is of great clinical importance in the medical board

evaluation of headaches.

F. I. Negodenko in the article "Phytoncide Therapy of Acute Pulmonary Abscesses" experience is shared in the treatment of 34 patients with acute pulmonary abscesses by the method of intratracheal injection of a garlic emulsion in 0.5 percent novocain solution.

Of the works of laboratory-clinical nature the article by L. L. Delyamure, "Determination of Protein in the Body Fluids by the Method of Fluorescence". The authors suggest a method of determining the protein by means of fluorescence. The method is simple: one-two cubic centimeters of concentrated sulfuric acid is introduced into a test-tube, and the same quantity of fluid under analysis is carefully layered onto it. The test tube is placed in a beam of ultra-violet rays, the source of which may be a mercurial-quartz PRK-four lamp with a filter mounted on it. When protein is present in the substrate being investigated a clearly outlined yellow-green ring appears at the boundary between the fluids. Its compactness and thickness are proportional to the concentration of protein. When there is a small concentration of protein (0.1 gram per thousand) the fluorescent ring is seen within 30 seconds. This method, in the author's opinion, ia s specific one for protein substances which does not depend on their structural characteristics for amino acid composition. In the investigation of spinal fluid, transudates and exudates it can, if necessary, replace the Heller or Rivalta tests and also make it possible to determine the quantitative concentration of proteins in these fluids.

In the remaining articles, which are devoted to the diagnosis and treatment of various diseases (intestinal obstruction, nephrolithiasis, acute odontogenic osteomyelitis of the mandible, etc.) based on factual material, there is also much that is interesting and instructive for the practicing physician.

The last article in the first part strays, as it were, from a general plan of the thematics, but it deals with a very important problem for naval physicians: the medical care of training for swimming great distances. The author of the article, I. M. Kondrat'yev, who has had considerable experience in this respect, gives very useful advice and recommendations which, undoubtedly, should be taken into consideration in the medical care of training and swimming races.

The second part of the collection includes observations from practice and therapeutic notes. (10 articles). Although the reports are also based chiefly on solitary observations from practice of casuistic nature, they still are

instructive, and, undoubtedly, supplement and extend the information on the clinical aspects and diagnosis of certain diseases.

The third part--brief abstracts--includes three articles of which the report "Neuroinfection with a Course of the Atropine Intoxication Type".

The collection has been well formulated; the articles are supplied with a brief index of the literature.

It should be mentioned that a shortcoming of the collection is its excessive overloading with articles. The collection would have benefited if the number of articles had been somewhat less and if the discussion of the questions raised were more detailed. The articles published in the forms of abstracts were not well selected. The article "Neuroinfection with a Course of the Atropine Intoxication Type" should have been given in the form of a more detailed report in the third section, "Observations from Practice and Therapeutic Notes" rather than as an abstract.

The conclusions of certain articles are inadequately founded and insufficiently convincing. Thus, for example, in an article already mentioned above, "Treatment of Botkin's Disease with Transfusion of Plasma" the hasty conclusion is drawn on the basis of observation of two patients with acute atrophy of the liver who had a fatal outcome that plasma transfusion is one of the most effective measures which can be used in this disease. In the article "Acute Intestinal Obstruction" the conclusion is justifiably drawn that a reduction in post-operative mortality has occurred in the past three years, because this was shown through the comparison of percentages obtained from small groups (69 and 19) which applied to different periods.

The naval physicians of the Sevastopol' Red Banner Hospital have done great scientific research work and, in publishing the collection, have been able to make it of value to the readers at large. The publication of the collection is a valuable gift of a group of naval physicians to the 175th anniversary of the Red Banner Naval Hospital of the Black Sea Fleet.

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